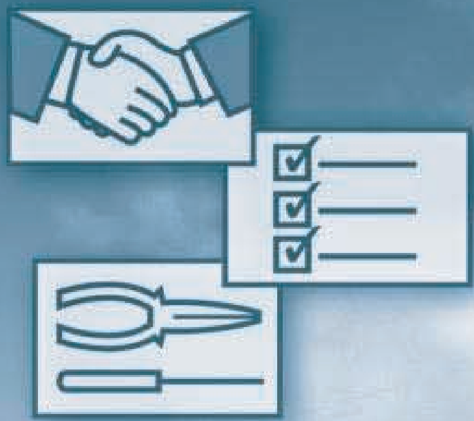
ESIE08-01



Service Manual

Altherma

- Outdoor unit
  - ERHQ011~016AAV3*
  - ERHQ011~016AAW1*

- Hydro-box
  - EKHBH(X)0016***

- Remote Alarm / Operation signal
  - EKRP1HB

- Altherma Room thermostat
  - EKRTW
  - EKRTR
  - EKRTETS

- Domestic hot water tank
  - EKSWW150~300V3/Z2
  - EKSWWU150~300V3
  - EKHWS150~300V3/Z2
  - EKHWSU150~300V3/Z2
  - EKHWE150~300V3/Z2

- Solar Kit
  - EKSOLHWAV1

1 Introduction

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1 Introduction

1.1 About This Manual

Target group

This service manual is intended for and should only be used by qualified engineers.

Purpose of this manual

This service manual contains all the information you need to carry out the necessary repair and maintenance tasks for the ALTHERMA.

Five parts

This service manual consists of an introduction, five parts and an index:

Introduction overview

The introduction contains the following topics:

Note:

This Service Manual is about ERHQ011~016 / EKHBH(X)016***. Please refer to Service Manual ESIE06-03 for details on ERYQ005~007 / EKHBH(X)007*** / ERHQ006~008 / EKHBH(X)008.

1.2 Safety Cautions

Cautions and warnings

- Be sure to read the following safety cautions before conducting repair work.
- The caution items are classified into “**Warning**” and “**Caution**”. The “**Warning**” items are especially important since they can lead to death or serious injury if they are not followed closely. The “**Caution**” items can also lead to serious accidents under some conditions if they are not followed. Therefore, be sure to observe all the safety caution items described below.
- About the pictograms

△ This symbol indicates an item for which caution must be exercised.

The pictogram shows the item to which attention must be paid.

○ This symbol indicates a prohibited action.

The prohibited item or action is shown inside or near the symbol.

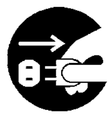
● This symbol indicates an action that must be taken, or an instruction.

The instruction is shown inside or near the symbol.

- After the repair work is complete, be sure to conduct a test operation to ensure that the equipment operates normally, and explain the cautions for operating the product to the customer.

1.2.1 Caution in Repair

Warning

Warning	
Be sure to disconnect the power cable plug from the plug socket before disassembling the equipment for a repair. Working on the equipment that is connected to a power supply can cause an electrical shook. If it is necessary to supply power to the equipment to conduct the repair or inspecting the circuits, do not touch any electrically charged sections of the equipment.	
If the refrigerant gas discharges during the repair work, do not touch the discharging refrigerant gas. The refrigerant gas can cause frostbite.	
When disconnecting the suction or discharge pipe of the compressor at the welded section, release the refrigerant gas completely at a well-ventilated place first. If there is a gas remaining inside the compressor, the refrigerant gas or refrigerating machine oil discharges when the pipe is disconnected, and it can cause injury.	
If the refrigerant gas leaks during the repair work, ventilate the area. The refrigerant gas can generate toxic gases when it contacts flames.	

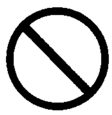
Warning	
The step-up capacitor supplies high-voltage electricity to the electrical components of the outdoor unit. Be sure to discharge the capacitor completely before conducting repair work. A charged capacitor can cause an electrical shock.	
Do not start or stop the air conditioner operation by plugging or unplugging the power cable plug. Plugging or unplugging the power cable plug to operate the equipment can cause an electrical shock or fire.	

Caution

Caution	
Do not repair the electrical components with wet hands. Working on the equipment with wet hands can cause an electrical shock.	
Do not clean the air conditioner by splashing water. Washing the unit with water can cause an electrical shock.	
Be sure to provide the grounding when repairing the equipment in a humid or wet place, to avoid electrical shocks.	
Be sure to turn off the power switch and unplug the power cable when cleaning the equipment. The internal fan rotates at a high speed, and cause injury.	
Do not tilt the unit when removing it. The water inside the unit can spill and wet the furniture and floor.	
Be sure to check that the refrigerating cycle section has cooled down sufficiently before conducting repair work. Working on the unit when the refrigerating cycle section is hot can cause burns.	
Use the welder in a well-ventilated place. Using the welder in an enclosed room can cause oxygen deficiency.	

1.2.2 Cautions Regarding Products after Repair

Warning

Warning	
Be sure to use parts listed in the service parts list of the applicable model and appropriate tools to conduct repair work. Never attempt to modify the equipment. The use of inappropriate parts or tools can cause an electrical shock, excessive heat generation or fire.	
When relocating the equipment, make sure that the new installation site has sufficient strength to withstand the weight of the equipment. If the installation site does not have sufficient strength and if the installation work is not conducted securely, the equipment can fall and cause injury.	
Be sure to install the product correctly by using the provided standard installation frame. Incorrect use of the installation frame and improper installation can cause the equipment to fall, resulting in injury.	For integral units only
Be sure to install the product securely in the installation frame mounted on a window frame. If the unit is not securely mounted, it can fall and cause injury.	For integral units only
Be sure to use an exclusive power circuit for the equipment, and follow the technical standards related to the electrical equipment, the internal wiring regulations and the instruction manual for installation when conducting electrical work. Insufficient power circuit capacity and improper electrical work can cause an electrical shock or fire.	
Be sure to use the specified cable to connect between the indoor and outdoor units. Make the connections securely and route the cable properly so that there is no force pulling the cable at the connection terminals. Improper connections can cause excessive heat generation or fire.	
When connecting the cable between the indoor and outdoor units, make sure that the terminal cover does not lift off or dismount because of the cable. If the cover is not mounted properly, the terminal connection section can cause an electrical shock, excessive heat generation or fire.	
Do not damage or modify the power cable. Damaged or modified power cable can cause an electrical shock or fire. Placing heavy items on the power cable, and heating or pulling the power cable can damage the cable.	
Do not mix air or gas other than the specified refrigerant (R-410A) in the refrigerant system. If air enters the refrigerating system, an excessively high pressure results, causing equipment damage and injury.	
If the refrigerant gas leaks, be sure to locate the leak and repair it before charging the refrigerant. After charging refrigerant, make sure that there is no refrigerant leak. If the leak cannot be located and the repair work must be stopped, be sure to perform pump-down and close the service valve, to prevent the refrigerant gas from leaking into the room. The refrigerant gas itself is harmless, but it can generate toxic gases when it contacts flames, such as fan and other heaters, stoves and ranges.	

Warning	
When replacing the coin battery in the remote controller, be sure to disposed of the old battery to prevent children from swallowing it. If a child swallows the coin battery, see a doctor immediately.	

Cautions

Caution	
Installation of a leakage breaker is necessary in some cases depending on the conditions of the installation site, to prevent electrical shocks.	
Do not install the equipment in a place where there is a possibility of combustible gas leaks. If a combustible gas leaks and remains around the unit, it can cause a fire.	
Be sure to install the packing and seal on the installation frame properly. If the packing and seal are not installed properly, water can enter the room and wet the furniture and floor.	For integral units only

1.2.3 Inspection after Repair

Warning

Warning	
Check to make sure that the power cable plug is not dirty or loose, then insert the plug into a power outlet all the way. If the plug has dust or loose connection, it can cause an electrical shock or fire.	
If the power cable and lead wires have scratches or deteriorated, be sure to replace them. Damaged cable and wires can cause an electrical shock, excessive heat generation or fire.	
Do not use a joined power cable or extension cable, or share the same power outlet with other electrical appliances, since it can cause an electrical shock, excessive heat generation or fire.	

Caution

Caution	
Check to see if the parts and wires are mounted and connected properly, and if the connections at the soldered or crimped terminals are secure. Improper installation and connections can cause excessive heat generation, fire or an electrical shock.	
If the installation platform or frame has corroded, replace it. Corroded installation platform or frame can cause the unit to fall, resulting in injury.	
Check the grounding, and repair it if the equipment is not properly grounded. Improper grounding can cause an electrical shock.	
Be sure to measure the insulation resistance after the repair, and make sure that the resistance is 1 Mohm or higher. Faulty insulation can cause an electrical shock.	
Be sure to check the drainage of the hydro-box after the repair. Faulty drainage can cause the water to enter the room and wet the furniture and floor.	

1.3 Combination Overview

Table

The table below contains the possible combinations between hydro-box units and outdoor units of the ALTHERMA series.

		Hydro-box 1~230V		Hydro-box 1~230V	
		Heating only	Reversible	Heating only	Reversible
		EKHBH016AA***(1)	EKHBX016AA***(1)	EKHBH016AB***(1)	EKHBX016AB***(1)
Outdoor unit 1~230V	ERHQ011AAV3(8)	0	0	0	0
	ERHQ014AAV3(8)	0	0	0	0
	ERHQ016AAV3(8)	0	0	0	0
Outdoor unit 3+N~400V	ERHQ011AAW1(8	0	0	0	0
	ERHQ014AAW1(8)	0	0	0	0
	ERHQ016AAW1(8)	0	0	0	0
Domestic hot water tank 1~230V	EKHWS(U)150V3(2)	0	0	0	0
	EKHWS(U)200V3(2)	0	0	0	0
	EKHWS(U)300V3(2)	0	0	0	0
Domestic hot water tank 2~400V	EKHWS[E]200Z2(3)	0	0	0	0
	EKHWS[E]300Z2(3)	0	0	0	0
Domestic hot water tank 1~230V	EKHWE150V3(4)	0	0	0	0
	EKHWE200V3(4)	0	0	0	0
	EKHWE300V3(4)	0	0	0	0
Solarkit 1~230V	EKSOLHWAV1(5)	-	-	0	0

Remarks

(1) *** : index for the factory mounted backup heater option 3~6V3 / 6~9T1 / 6~9WN

(2) (U) :Domestic hot water tank stainless special for UK market

(3) [E] :Domestic hot water tank enamel

(4) [E] :Domestic hot water tank enamel

(5) Solarkit :The EKSOLHWAV1can only be combined with domestic hot water tank with solarsensor socket (EKHWS[E]******)

		Hydro-box 1~230V		Options			
		Heating only Reversible	Heating only Reversible	Solar kit	UK tank kit (incl 2-WV)	UK tank kit (excl 2-WV)	Seperate 2-WV
		EKHBH(X)016AA*(1)**	**EKHBH(X)016AB***(1)**	**EKSOLHWAV1**	**EKUHWA (6)**	**EKUHWB (7)**	**EKUHW2WB (7)**
Domestic hot water tank 1~230V	**EKHWS150*V3(2)**	o	o	o	-	-	-
	EKHWS200*V3(2)	o	o	o	-	-	-
	EKHWS300*V3(2)	o	o	o	-	-	-
Domestic hot water tank 2~400V	**EKHWS200*Z2(2)**	o	o	o	-	-	-
	EKHWS300*Z2(2)	o	o	o	-	-	-
Domestic hot water tank 1~230V	**EKHWSU150AV3(3)**	o	o	o	o	o(8)	o(8)
	EKHWSU200AV3(3)	o	o	o	o	o(8)	o(8)
	EKHWSU300AV3(3)	o	o	o	o	o(8)	o(8)
Domestic hot water tank 1~230V	**EKHWSU150BV3(4)**	o	o	o	o(9)	o(10)	o(10)
	EKHWSU200BV3(4)	o	o	o	o(9)	o(10)	o(10)
	EKHWSU300BV3(4)	o	o	o	o(9)	o(10)	o(10)
Domestic hot water tank 1~230V	**EKHWE150AV3(5)**	o	o	o	-	-	-
	EKHWE200AV3(5)	o	o	o	-	-	-
	EKHWE300AV3(5)	o	o	o	-	-	-
Domestic hot water tank 2~400V	**EKHWE200AZ2(5)**	o	o	o	-	-	-
	EKHWE300AZ2(5)	o	o	o	-	-	-

Remarks

(1) *** : index for the factory mounted backup heater option 3~6V3 / 6~9T1 / 6~9WN

(2) :Domestic hot water tank stainless with extra connection for hot water recirculation:

- 'A': **without** 3-way valve
- 'B': **with** 3-way valve

(3) :Domestic hot water tank stainless special for UK market with extra connection for hot water recirculation. **Without** 3-way valve

(4) :Domestic hot water tank stainless special for UK market with extra connection for hot water recirculation. **With** 3-way valve

(5) :Domestic hot water tank enamel with extra connection for hot water recirculation. **With** 3-way valve

(6) :EKUHWA is the substitute of EKUSWW. Kit contains 2-way valve (2-way valve only required in combination with solar kit)

(7) :EKUHWB doesn't contain 2-way valve. In case solar kit is used (2-way valve is required) EKUHW2WB has to be ordered additionally.

(8) :Combination is possible but EKUHWB & EKUHW2WB are always required (2-way valve is required, no 3-way valve delivered with tank).

(9) :Only for connection to solar, 2-way valve is obligated.

(10) :Only for connection to solar, both EKUHWB & EKUHW2WB are required (2-way valve is obligated).

1.4 Precautions on handling new refrigerants

1.4.1 Outline

About Refrigerant R410A

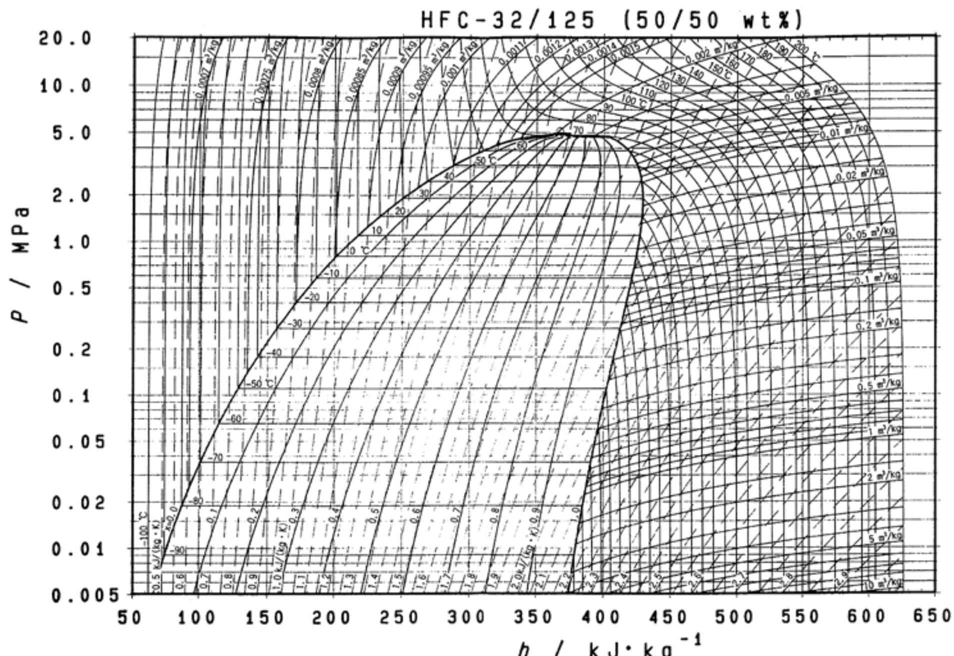
- Characteristics of new refrigerant, R410A

1. Performance
   Almost the same performance as R22 and R407C.
2. Pressure
   Working pressure is approx. 1.4 times more than R22 and R407C.
3. Refrigerant composition
   Few problems in composition control, since it is a Quasi-azeotropic mixture refrigerant.

	HFC units (Units using new refrigerants)		HCFC units
Refrigerant name	**R407C**	**R410A**	**R22**
Composing substances	Non-azeotropic mixture of HFC32, HFC125 and HFC134a (*1)	Quasi-azeotropic mixture of HFC32 and JFC125 (*1)	Single-component refrigerant
Design pressure	3.2 Mpa (gauge pressure) = 32.6 kgf/cm^2	4.15 Mpa (gauge pressure) = 42.3 kgf/cm^2	2.75Mpa (gauge pressure) = 28.0 kgf/cm^2
Refrigerant oil	Synthetic oil (Ether)		Mineral oil (Suniso)
Ozone destruction factor (ODP)	0	0	0.05
Combustibility	None	None	None
Toxicity	None	None	None

*1. Non-azeotropic mixture refrigerant: mixture of two or more refrigerants having different boiling points.
*2. Quasi-azeotropic mixture refrigerant: mixture of two or more refrigerants having similar boiling points.
*3. The design pressure is different at each product. Please refer to the installation manual for each product.

(Reference) 1 Mpa ≒ 1 0.19716 kgf / cm^2



Pressure-Enthalpy curves of HFC-32/125 (50/50wt%)

■ Thermodynamic characteristic of R410A

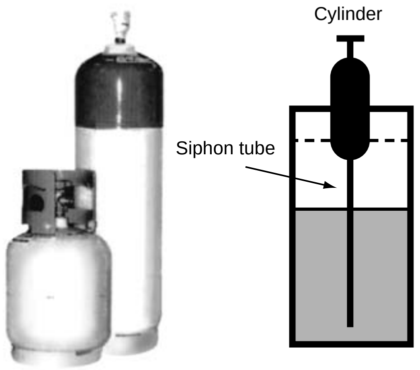
DAIREP ver2.0

Temperature (℃)	Steam pressure (kPa)		Density (kg/m^3)		Specific heat at constant pressure (kJ/kgK)		Specific enthalpy (kJ/kg)		Specific entropy (kJ/KgK)	
	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor
-70	36.13	36.11	1410.7	1.582	1.372	0.695	100.8	390.6	0.649	2.074
-68	40.83	40.80	1404.7	1.774	1.374	0.700	103.6	391.8	0.663	2.066
-66	46.02	45.98	1398.6	1.984	1.375	0.705	106.3	393.0	0.676	2.058
-64	51.73	51.68	1392.5	2.213	1.377	0.710	109.1	394.1	0.689	2.051
-62	58.00	57.94	1386.4	2.463	1.378	0.715	111.9	395.3	0.702	2.044
-60	64.87	64.80	1380.2	2.734	1.379	0.720	114.6	396.4	0.715	2.037
-58	72.38	72.29	1374.0	3.030	1.380	0.726	117.4	397.6	0.728	2.030
-56	80.57	80.46	1367.8	3.350	1.382	0.732	120.1	398.7	0.741	2.023
-54	89.49	89.36	1361.6	3.696	1.384	0.737	122.9	399.8	0.754	2.017
-52	99.18	99.03	1355.3	4.071	1.386	0.744	125.7	400.9	0.766	2.010
-51.58	101.32	101.17	1354.0	4.153	1.386	0.745	126.3	401.1	0.769	2.009
-50	109.69	109.51	1349.0	4.474	1.388	0.750	128.5	402.0	0.779	2.004
-48	121.07	120.85	1342.7	4.909	1.391	0.756	131.2	403.1	0.791	1.998
-46	133.36	133.11	1336.3	5.377	1.394	0.763	134.0	404.1	0.803	1.992
-44	146.61	146.32	1330.0	5.880	1.397	0.770	136.8	405.2	0.816	1.987
-42	160.89	160.55	1323.5	6.419	1.401	0.777	139.6	406.2	0.828	1.981
-40	176.24	175.85	1317.0	6.996	1.405	0.785	142.4	407.3	0.840	1.976
-38	192.71	192.27	1310.5	7.614	1.409	0.792	145.3	408.3	0.852	1.970
-36	210.37	209.86	1304.0	8.275	1.414	0.800	148.1	409.3	0.864	1.965
-34	229.26	228.69	1297.3	8.980	1.419	0.809	150.9	410.2	0.875	1.960
-32	249.46	248.81	1290.6	9.732	1.424	0.817	153.8	411.2	0.887	1.955
-30	271.01	270.28	1283.9	10.53	1.430	0.826	156.6	412.1	0.899	1.950
-28	293.99	293.16	1277.1	11.39	1.436	0.835	159.5	413.1	0.911	1.946
-26	318.44	317.52	1270.2	12.29	1.442	0.844	162.4	414.0	0.922	1.941
-24	344.44	343.41	1263.3	13.26	1.448	0.854	165.3	414.9	0.934	1.936
-22	372.05	370.90	1256.3	14.28	1.455	0.864	168.2	415.7	0.945	1.932
-20	401.34	400.06	1249.2	15.37	1.461	0.875	171.1	416.6	0.957	1.927
-18	432.36	430.95	1242.0	16.52	1.468	0.886	174.1	417.4	0.968	1.923
-16	465.20	463.64	1234.8	17.74	1.476	0.897	177.0	418.2	0.980	1.919
-14	499.91	498.20	1227.5	19.04	1.483	0.909	180.0	419.0	0.991	1.914
-12	536.58	534.69	1220.0	20.41	1.491	0.921	182.9	419.8	1.003	1.910
-10	575.26	573.20	1212.5	21.86	1.499	0.933	185.9	420.5	1.014	1.906
-8	616.03	613.78	1204.9	23.39	1.507	0.947	189.0	421.2	1.025	1.902
-6	658.97	656.52	1197.2	25.01	1.516	0.960	192.0	421.9	1.036	1.898
-4	704.15	701.49	1189.4	26.72	1.524	0.975	195.0	422.6	1.048	1.894
-2	751.64	748.76	1181.4	28.53	1.533	0.990	198.1	423.2	1.059	1.890
0	801.52	798.41	1173.4	30.44	1.543	1.005	201.2	423.8	1.070	1.886
2	853.87	850.52	1165.3	32.46	1.552	1.022	204.3	424.4	1.081	1.882
4	908.77	905.16	1157.0	34.59	1.563	1.039	207.4	424.9	1.092	1.878
6	966.29	962.42	1148.6	36.83	1.573	1.057	210.5	425.5	1.103	1.874
8	1026.5	1022.4	1140.0	39.21	1.584	1.076	213.7	425.9	1.114	1.870
10	1089.5	1085.1	1131.3	41.71	1.596	1.096	216.8	426.4	1.125	1.866
12	1155.4	1150.7	1122.5	44.35	1.608	1.117	220.0	426.8	1.136	1.862
14	1224.3	1219.2	1113.5	47.14	1.621	1.139	223.2	427.2	1.147	1.859
16	1296.2	1290.8	1104.4	50.09	1.635	1.163	226.5	427.5	1.158	1.855
18	1371.2	1365.5	1095.1	53.20	1.650	1.188	229.7	427.8	1.169	1.851
20	1449.4	1443.4	1085.6	56.48	1.666	1.215	233.0	428.1	1.180	1.847
22	1530.9	1524.6	1075.9	59.96	1.683	1.243	236.4	428.3	1.191	1.843
24	1615.8	1609.2	1066.0	63.63	1.701	1.273	239.7	428.4	1.202	1.839
26	1704.2	1697.2	1055.9	67.51	1.721	1.306	243.1	428.6	1.214	1.834
28	1796.2	1788.9	1045.5	71.62	1.743	1.341	246.5	428.6	1.225	1.830
30	1891.9	1884.2	1034.9	75.97	1.767	1.379	249.9	428.6	1.236	1.826
32	1991.3	1983.2	1024.1	80.58	1.793	1.420	253.4	428.6	1.247	1.822
34	2094.5	2086.2	1012.9	85.48	1.822	1.465	256.9	428.4	1.258	1.817
36	2201.7	2193.1	1001.4	90.68	1.855	1.514	260.5	428.3	1.269	1.813
38	2313.0	2304.0	989.5	96.22	1.891	1.569	264.1	428.0	1.281	1.808
40	2428.4	2419.2	977.3	102.1	1.932	1.629	267.8	427.7	1.292	1.803
42	2548.1	2538.6	964.6	108.4	1.979	1.696	271.5	427.2	1.303	1.798
44	2672.2	2662.4	951.4	115.2	2.033	1.771	275.3	426.7	1.315	1.793
46	2800.7	2790.7	937.7	122.4	2.095	1.857	279.2	426.1	1.327	1.788
48	2933.7	2923.6	923.3	130.2	2.168	1.955	283.2	425.4	1.339	1.782
50	3071.5	3061.2	908.2	138.6	2.256	2.069	287.3	424.5	1.351	1.776
52	3214.0	3203.6	892.2	147.7	2.362	2.203	291.5	423.5	1.363	1.770
54	3361.4	3351.0	875.1	157.6	2.493	2.363	295.8	422.4	1.376	1.764
56	3513.8	3503.5	856.8	168.4	2.661	2.557	300.3	421.0	1.389	1.757
58	3671.3	3661.2	836.9	180.4	2.883	2.799	305.0	419.4	1.403	1.749
60	3834.1	3824.2	814.9	193.7	3.191	3.106	310.0	417.6	1.417	1.741
62	4002.1	3992.7	790.1	208.6	3.650	3.511	315.3	415.5	1.433	1.732
64	4175.7	4166.8	761.0	225.6	4.415	4.064	321.2	413.0	1.450	1.722

1.4.2 Refrigerant Cylinders

Cylinder specifications

- The cylinder is painted refrigerant color (pink).
- The cylinder valve is equipped with a siphon tube.



Note: Refrigerant can be charged in liquid state with cylinder in upright position.

Caution!: Do not lay cylinder on its side during charging, since it causes refrigerant in gas state to enter the system.

Handling of cylinders

1 Laws and regulations
R410A is liquefied gas, and the High-Pressure Gas Safety Law must be observed in handling them. Before using, refer to the High-Pressure Gas Safety Law.
The Law stipulates standards and regulations that must be followed to prevent accidents with high-pressure gases. Be sure to follow the regulations.

2 Handing of vessels
Since R410A is high-pressure gas, it is contained in high-pressure vessels.
Although those vessels are durable and strong, careless handling can cause damage that can lead to unexpected accidents. Do not drop vessels, let them fall, apply impact or roll them on the ground.

3 Storage
Although R410A is not flammable, it must be stored in a well-ventilated, cool, and dark place in the same way as any other high-pressure gases.
It should also be noted that high-pressure vessels are equipped with safety devices that releases gas when the ambient temperature reaches more than a certain level (fusible plug melts) and when the pressure exceeds a certain level (spring-type safety valve operates).

1.4.3 Service Tools

R410A is used under higher working pressure, compared to previous refrigerants (R22,R407C). Furthermore, the refrigerating machine oil has been changed from Suniso oil to Ether oil, and if oil mixing is occurred, sludge results in the refrigerants and causes other problems. Therefore, gauge manifolds and charge hoses that are used with a previous refrigerant (R22,R407C) can not be used for products that use new refrigerants.

Be sure to use dedicated tools and devices.

■ Tool compatibility

Tool	Compatibility			Reasons for change
	HFC		HCFC	
	R410A	R407C	R22	
Gauge manifold Charge hose	X			■ Do not use the same tools for R22 and R410A. ■ Thread specification differs for R410A and R407C.
Charging cylinder	X		O	■ Weighting instrument used for HFCs.
Gas detector	O		X	■ The same tool can be used for HFCs.
Vacuum pump (pump with reverse flow preventive function)	O			■ To use existing pump for HFCs, vacuum pump adaptor must be installed.
Weighting instrument	O			
Charge mouthpiece	X			■ Seal material is different between R22 and HFCs. ■ Thread specification is different between R410A and others.
Flaring tool (Clutch type)	O			■ For R410A, flare gauge is necessary.
Torque wrench	O			■ Torque-up for 1/2 and 5/8
Pipe cutter	O			
Pipe expander	O			
Pipe bender	O			
Pipe assembling oil	X			■ Due to refrigerating machine oil change. (No Suniso oil can be used.)
Refrigerant recovery device	Check your recovery device.			
Refrigerant piping	See the chart below.			■ Only ϕ19.1 is changed to 1/2H material while the previous material is "O".

As for the charge mouthpiece and packing, 1/2UNF20 is necessary for mouthpiece size of charge hose.

Copper tube material and thickness

Pipe size	R407C		R410A	
	Material	Thickness t (mm)	Material	Thickness t (mm)
ϕ6.4	O	0.8	O	0.8
ϕ9.5	O	0.8	O	0.8
ϕ12.7	O	0.8	O	0.8
ϕ15.9	O	1.0	O	1.0
ϕ19.1	O	1.0	1/2H	1.0

* O: Soft (Annealed)
  H: Hard (Drawn)

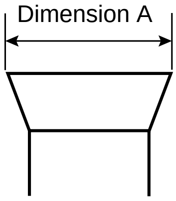
Flaring tool

Flare gauge

■ Specifications
• Dimension A

Nominal size	Tube O.D.	$A^{+0}_{-0.4}$	
	Do	Class-2 (R410A)	Class-1 (Conventional)
1/4	6.35	9.1	9.0
3/8	9.52	13.2	13.0
1/2	12.70	16.6	16.2
5/8	15.88	19.7	19.4
3/4	19.05	24.0	23.3

- ■ Differences
- • Change of dimension A



For class-1: R407C
For class-2: R410A

Conventional flaring tools can be used when the work process is changed. (change of work process)

Previously, a pipe extension margin of 0 to 0.5mm was provided for flaring. For R410A air conditioners, perform pipe flaring with a pipe extension margin of **1.0 to 1.5 mm**. (For clutch type only)

Conventional tool with pipe extension margin adjustment can be used.

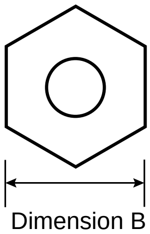
Torque wrench

- ■ Specifications
- • Dimension B Unit:mm

Nominal size	Class-1	Class-2	Previous
1/2	24	26	24
5/8	27	29	27

No change in tightening torque
No change in pipes of other sizes

- ■ Differences
- • Change of dimension B
Only 1/2", 5/8" are extended



For class-1: R407C
For class-2: R410A

Vacuum pump with check valve

Vacuum pump adaptor
(Reverse flow preventive vacuum adaptor)

■ Specifications

- Discharge speed
  50 l/min (50Hz)
  60 l/min (60Hz)
- Suction port UNF7/16-20(1/4 Flare)
  UNF1/2-20(5/16 Flare) with adaptor

- Maximum degree of vacuum
  Select a vacuum pump which is able to keep the vacuum degree of the system in excess of -100.7 kpa (5 torr – 755 mmHg)

■ Differences

- Equipped with function to prevent reverse oil flow
- Previous vacuum pump can be used by installing adaptor.

Leak tester

■ Specifications

- Hydrogen detecting type, etc.
- Applicable refrigerants
  R410A, R407C, R404A, R507A, R134a, etc.

■ Differences

- Previous testers detected chlorine. Since HFCs do not contain chlorine, new tester detects hydrogen.

Refrigerant oil (Air compal)

■ Specifications

- Contains synthetic oil, therefore it can be used for piping work of every refrigerant cycle.
- Offers high rust resistance and stability over long period of time.

■ Differences

- Can be used for R410A and R22 units.

Gauge manifold for R410A

- ■ Specifications
- High pressure gauge
  - 0.1 to 5.3 MPa (-76 cmHg to 53 kg/cm^2)
- Low pressure gauge
  - 0.1 to 3.8 MPa (-76 cmHg to 38 kg/cm^2)
- 1/4" →5/16" (2min →2.5min)
- No oil is used in pressure test of gauges.
  →For prevention of contamination
- Temperature scale indicates the relationship between pressure and temperature in gas saturated state.

- ■ Differences
- Change in pressure
- Change in service port diameter

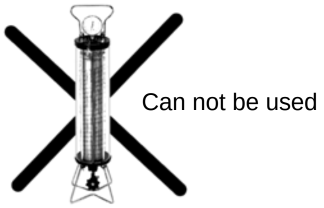
Charge hose for R410A

(Hose with ball valve)

- ■ Specifications
- Working pressure 5.08 MPa (51.8 kg/cm^2)
- Rupture pressure 25.4 MPa (259 kg/cm^2)
- Available with and without hand-operate valve that prevents refrigerant from outflow.

- ■ Differences
- Pressure proof hose
- Change in service port diameter
- Use of nylon coated material for HFC resistance

Charging cylinder



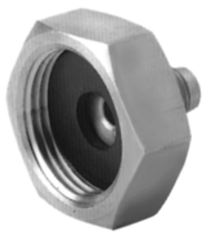
- ■ Specifications
- • Use weigher for refrigerant charge listed below to charge directly from refrigerant cylinder.
- ■ Differences
- • The cylinder can not be used for mixed refrigerant since mixing ratio is changed during charging.

  When R410A is charged in liquid state using charging cylinder, foaming phenomenon is generated inside charging cylinder.

Weigher for refrigerant charge

- ■ Specifications
- • High accuracy
  TA101A (for 10-kg cylinder) = ± 2g
  TA101B (for 20-kg cylinder) = ± 5g
- • Equipped with pressure-resistant sight glass to check liquid refrigerant charging.
- • A manifold with separate ports for HFCs and previous refrigerants is equipped as standard accessories.
- ■ Differences
- • Measurement is based on weight to prevent change of mixing ratio during charging.

Charge mouthpiece



- ■ Specifications
- • For R410A, 1/4"→5/16" (2min →2.5min)
- • Material is changed from CR to H-NBR.
- ■ Differences
- • Change of thread specification on hose connection side (For the R410A use)
- • Change of sealer material for the HFCs use.

Part 1
System Outline

What is in this part?

This part contains the following chapters:

1

1 General Outline: Altherma

1.1 What Is in This Chapter?

Introduction

This chapter contains the following information on the Altherma:

- Outlook and dimensions
- Installation and service space
- Components
- Physical limitations and limits of operation
- Drainpan kit necessity

General outline

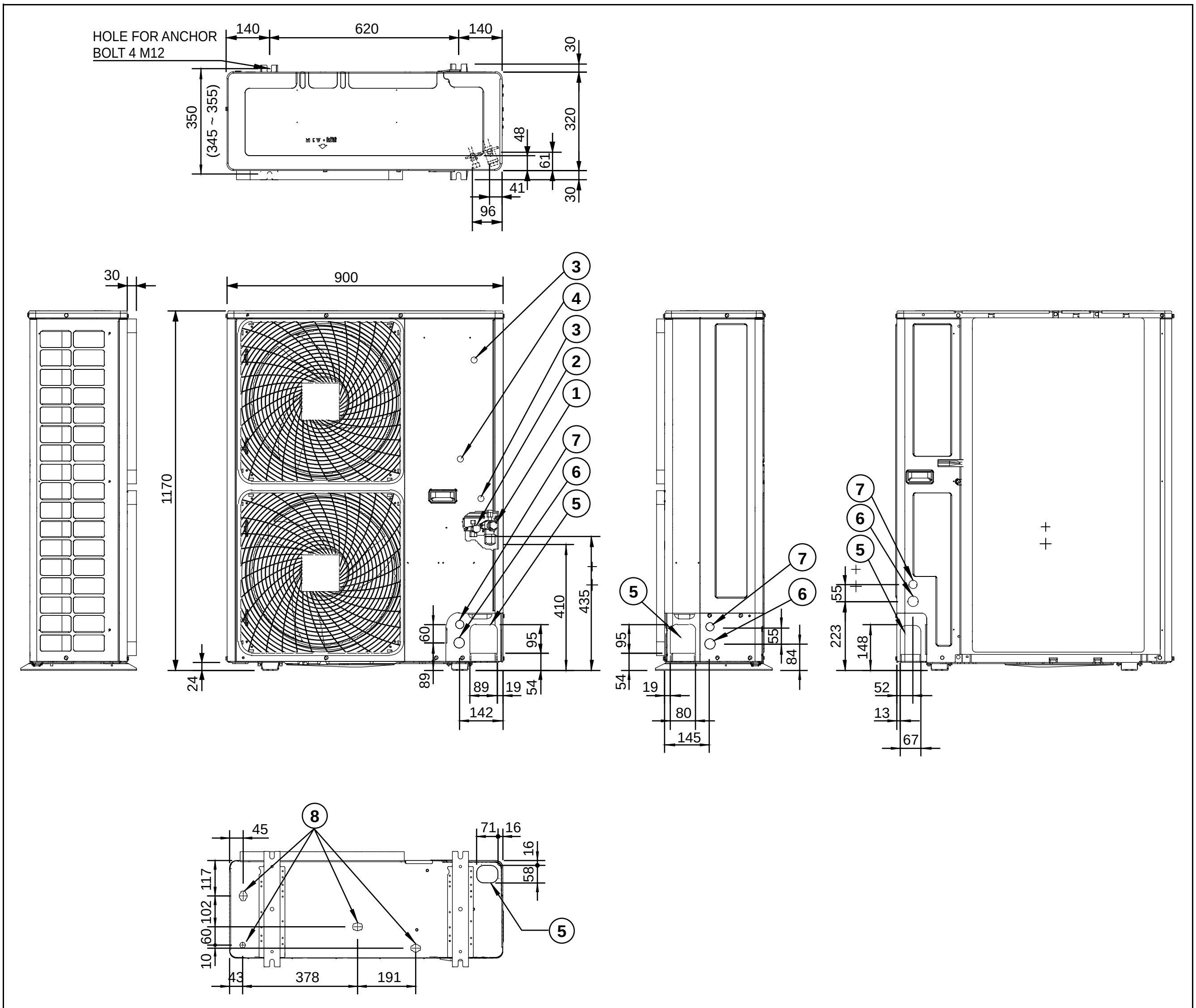
This chapter contains the following general outlines:

1

1.2 ERHQ011~016AAV3: Outlook and Dimensions

Outlook and dimensions

The illustration below shows the outlook and the dimensions of the unit (mm).



Installation and service space

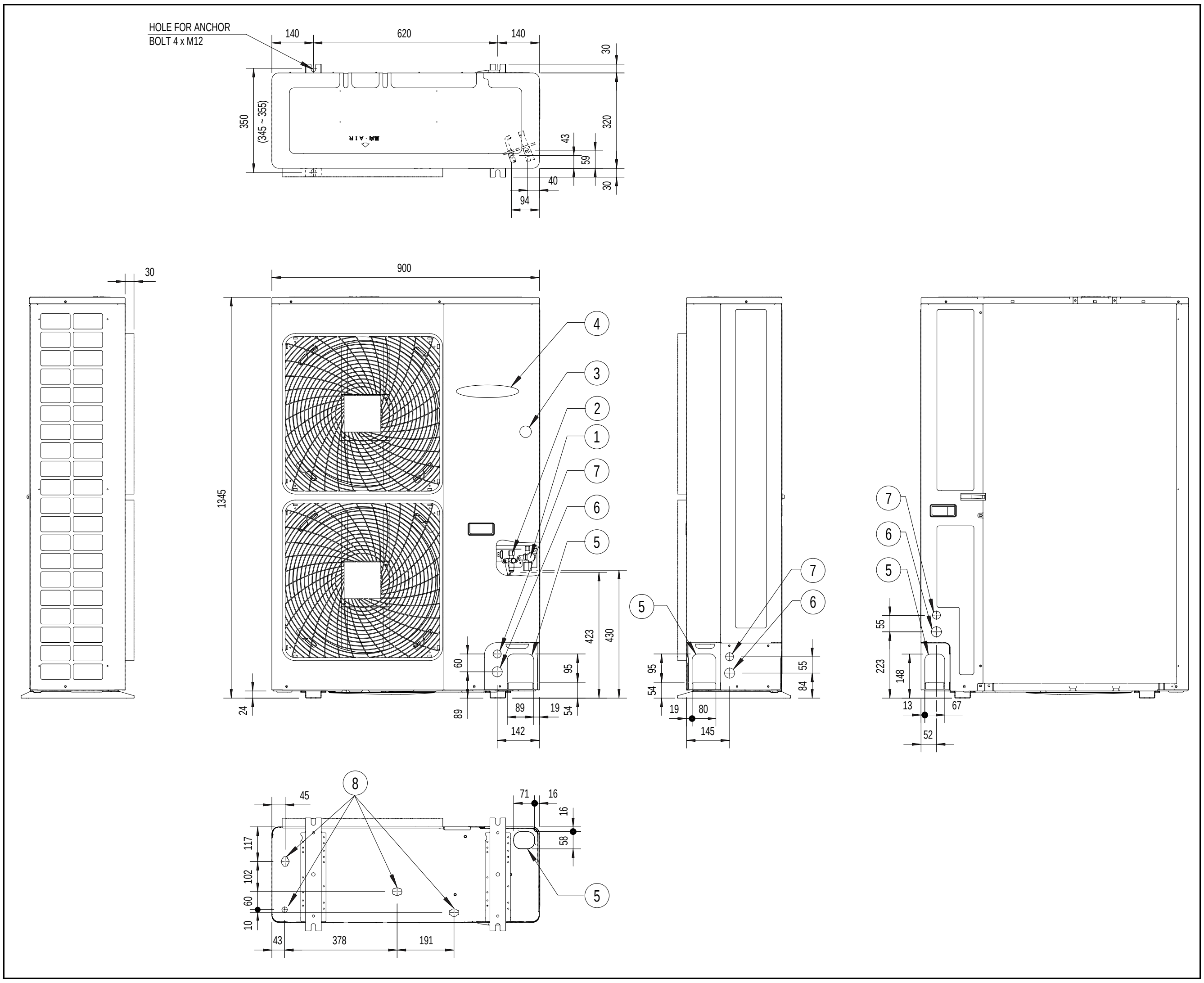
See page 1–26.

1

1.3 ERHQ011~016AAW1: Outlook and Dimensions

Outlook and dimensions

The illustration below shows the outlook and the dimensions of the unit (mm)



Installation and service space

See page 1–26.

1

Components

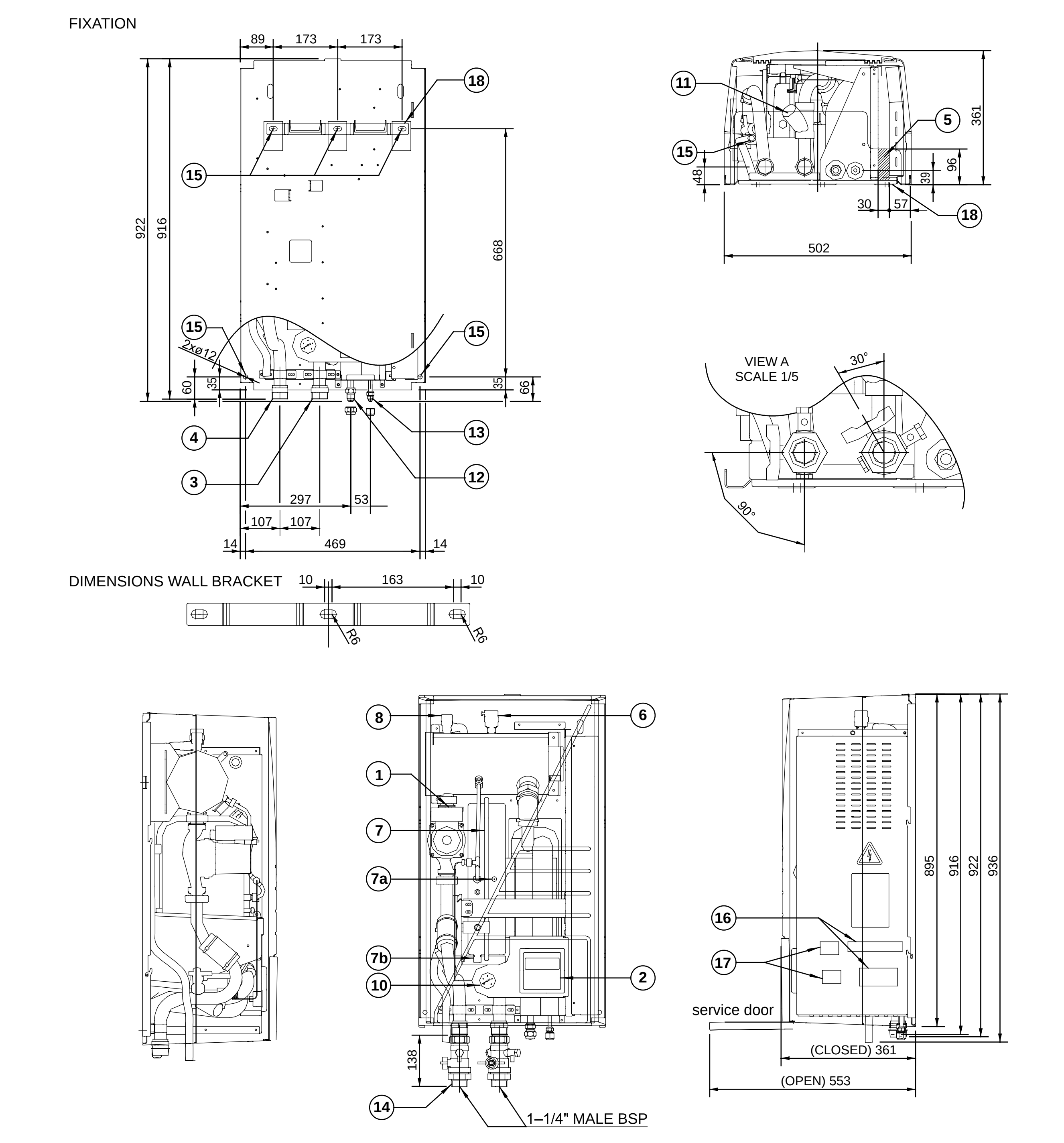
The table below contains the different components of the unit.

No.	Component
1	Gas pipe connection ϕ15.9 flare
2	Liquid pipe connection ϕ9.5 flare
3	Service port (in the unit)
4	Electronic and Grounding terminal M5 (in switch box)
5	Refrigerant piping intake
6	Power supply wiring intake (knock out hole ϕ34)
7	Control wiring intake (knock out hole ϕ27)
8	Drain outlet

1.4 EKHBH016A***: Outlook and Dimensions

Outlook and dimensions

The illustration below shows the outlook and the dimensions of the unit (mm).



Installation and service space

See page 1–28.

1

Components

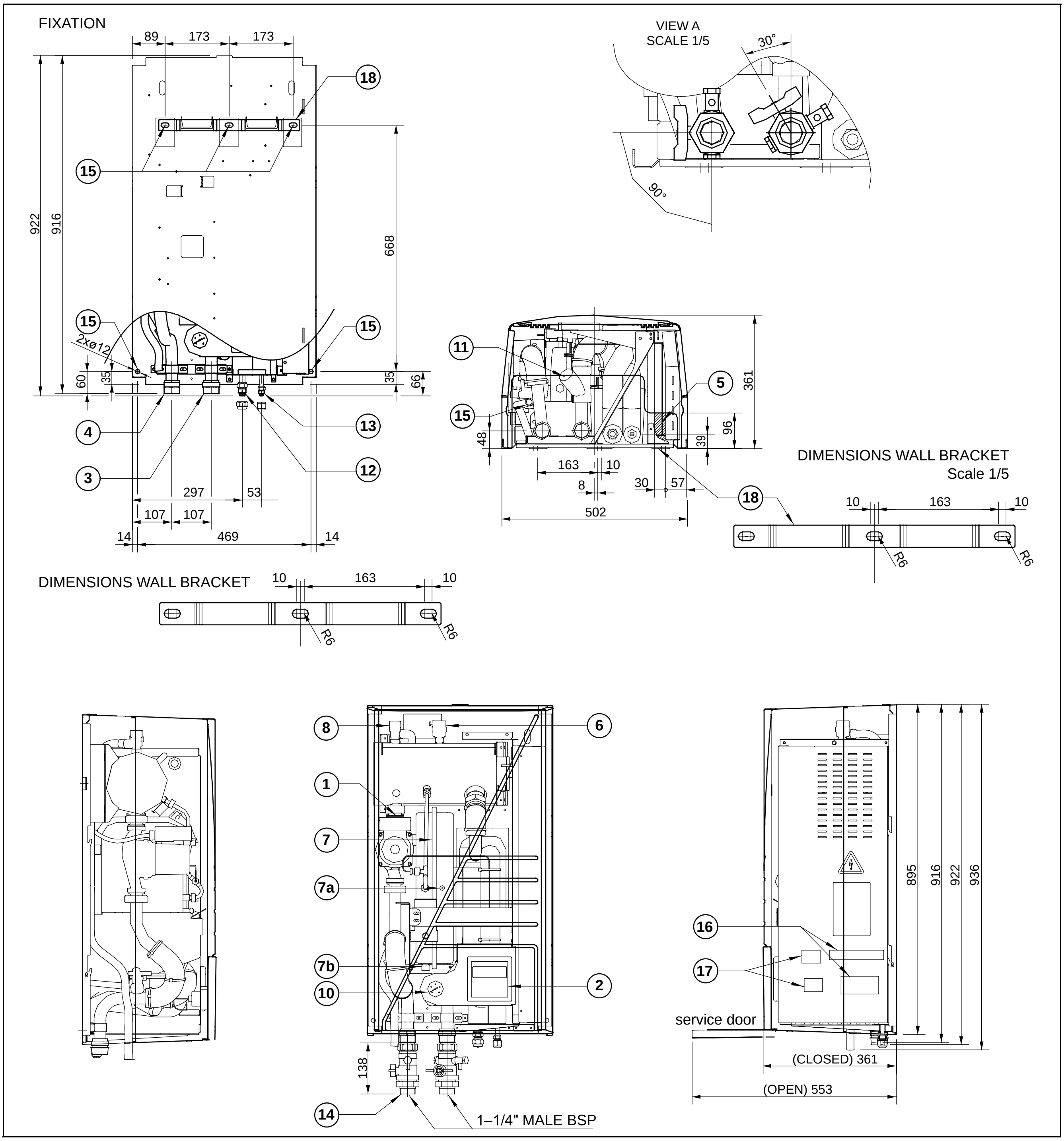
The table below contains the different components of the unit.

No.	Component
1	Pump + switch for speed setting
2	Remocon
3	Water IN connection 1-1/4” M BSP
4	Water OUT connection 1-1/4” M BSP
5	Power supply intake (+ domestic hot water tank)
6	Air purge
7	Expansion vessel + 7a nipple + 7b drain
8	Blow off valve
9	Blow off drain (flexible hose ϕ20)
10	Pressure gauge
11	Waterfilter
12	Suction pipe connection ϕ15.9 flare connection
13	Liquid pipe connection ϕ9.52 flare connection
14	Shut off valves with drain/fill valve (accessory delivered with unit)
15	Holes for fixation
16	Switchbox terminals
17	Switchbox terminals option domestic hot water tank
18	Wallbracket

1.5 EKHBX016A***: Outlook and Dimensions

Outlook and dimensions

The illustration below shows the outlook and the dimensions of the unit (mm).



Installation and service space

See page 1–28.

1

Components

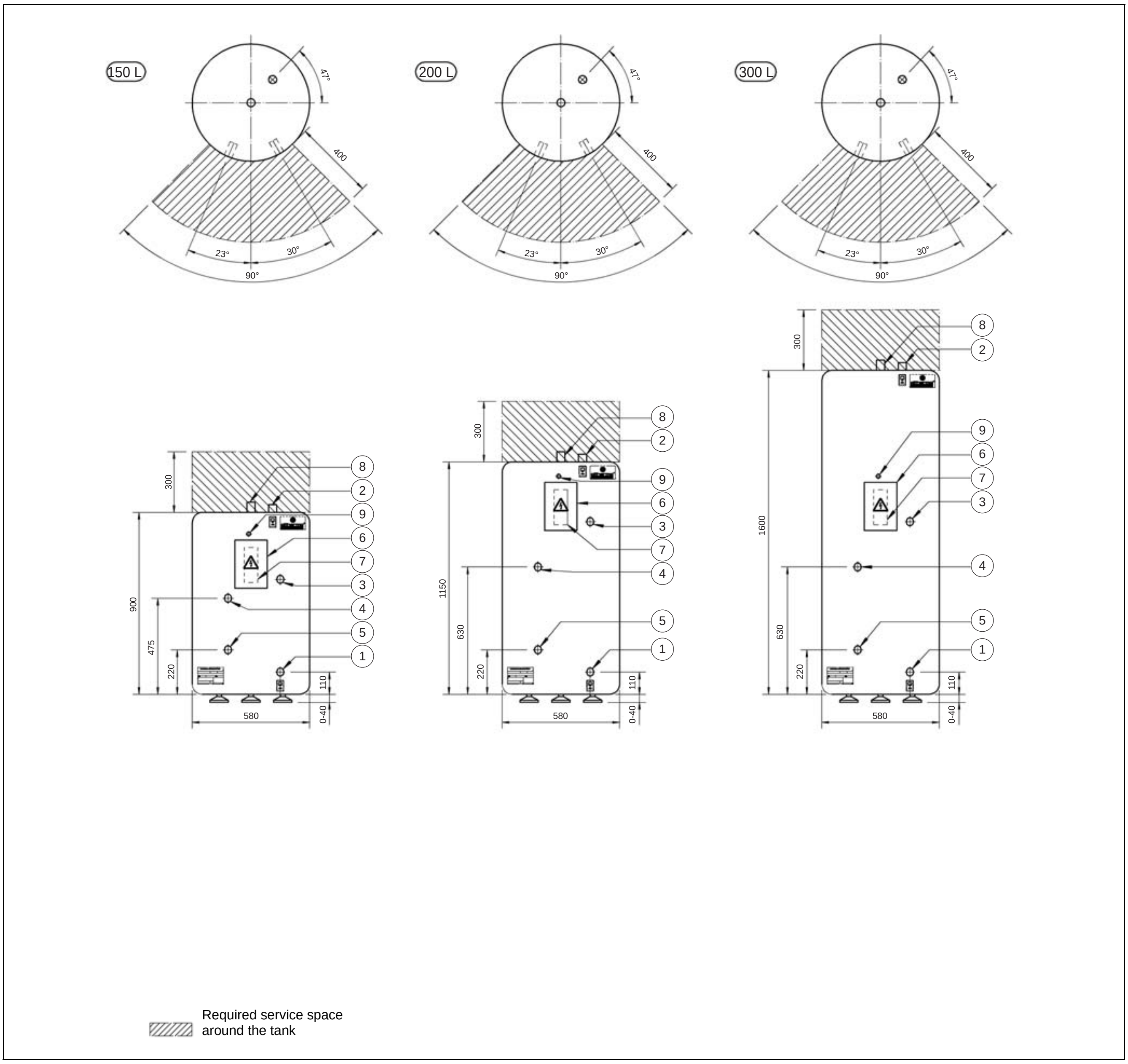
The table below contains the different components of the unit.

No.	Component
1	Pump + switch for speed setting
2	Remocon
3	Water IN connection 1-1/4” M BSP
4	Water OUT connection 1-1/4” M BSP
5	Power supply intake (+ domestic hot water tank)
6	Air purge
7	Expansion vessel + 7a nipple + 7b drain
8	Blow off valve
9	Blow off drain (flexible hose ϕ20)
10	Pressure gauge
11	Waterfilter
12	Suction pipe connection ϕ15.9 flare connection
13	Liquid pipe connection ϕ9.52 flare connection
14	Shut off valves with drain/fill valve (accessory delivered with unit)
15	Holes for fixation
16	Switchbox terminals
17	Switchbox terminals option domestic hot water tank
18	Wallbracket

1.6 EKSWW150~300V3/Z2: Outlook and Dimensions - Service Space

Outlook and dimensions - Service space

The illustration below shows the outlook and the dimensions of the unit (mm).



1

Components

The table below contains the different components of the unit.

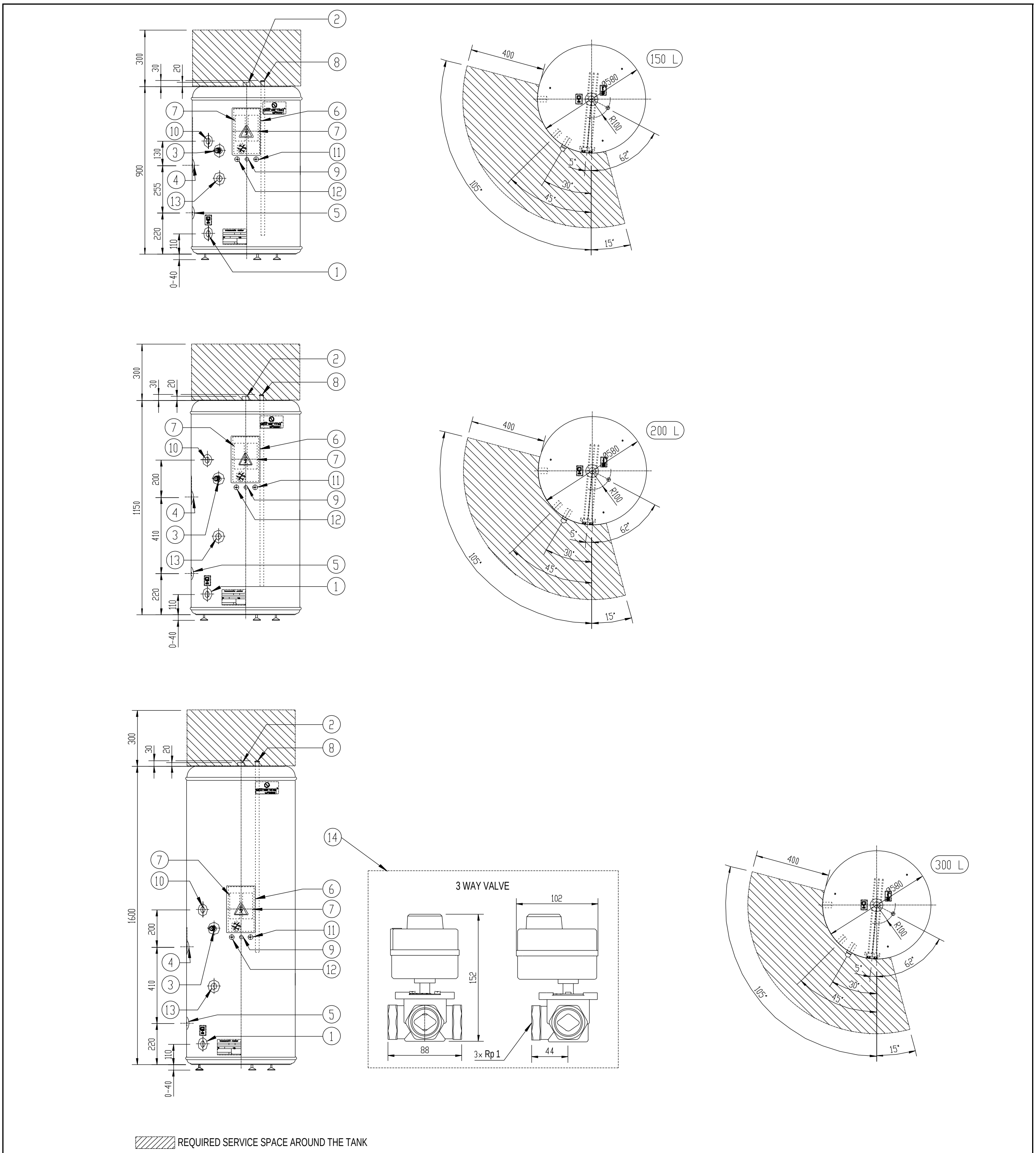
No.	Component
1	Water mains IN female 3/4’ BSP
2	Water mains OUT female 3/4’ BSP
3	Thermistor connection female 1/2’ BSP
4	Flow (from Hydro-box) female 3/4’ BSP
5	Return (to Hydro-box) female 3/4’ BSP
6	Switchbox
7	Clixon
8	Connection female 1/2’ BSP
9	Power entrance

1

1.7 EKHWS150~300*V3/Z2: Outlook and Dimensions - Service Space

Outlook and dimensions - Service space

The illustration below shows the outlook and the dimensions of the unit (mm)



1

Components

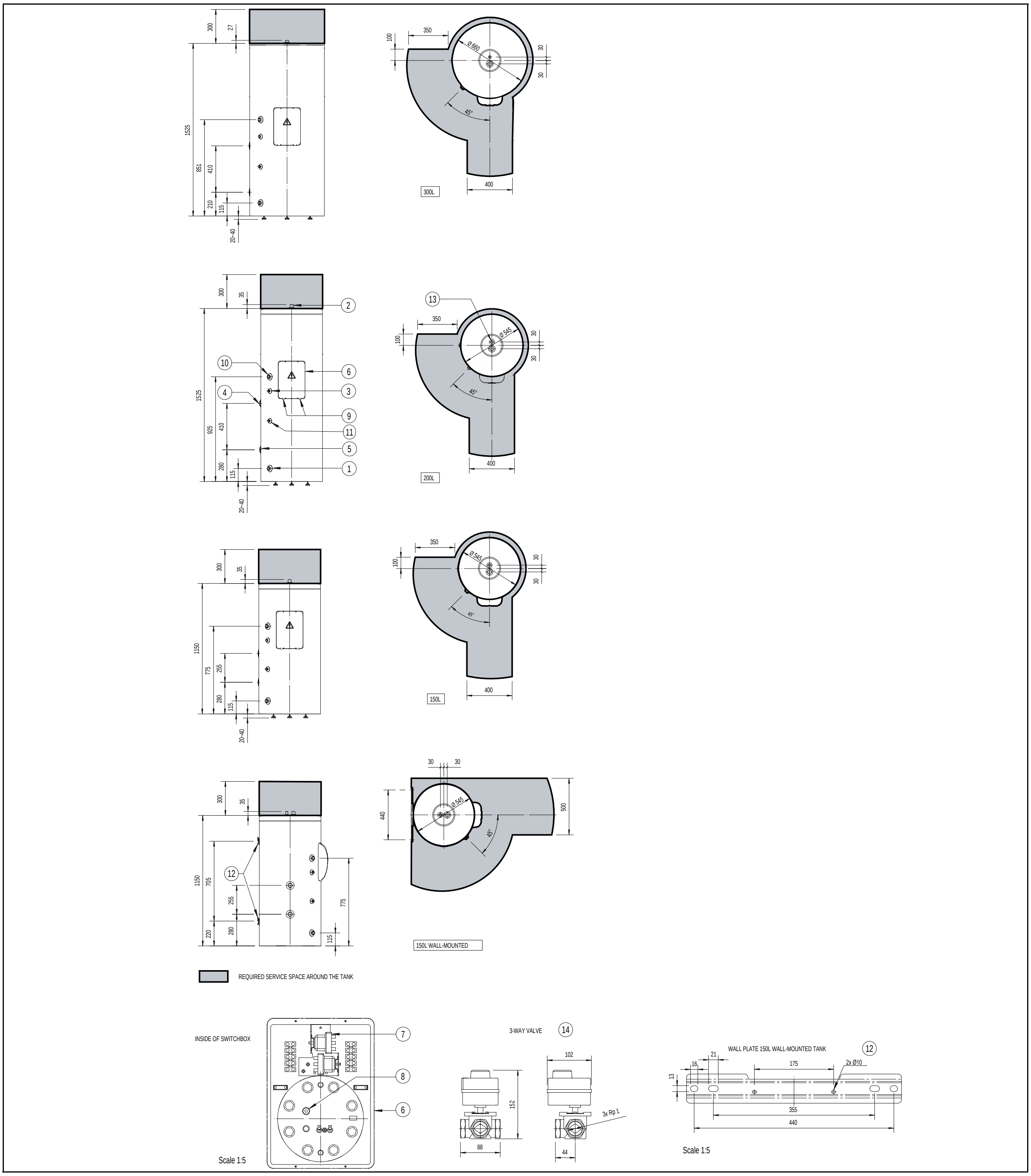
The table below contains the different components of the unit.

No.	Component
1	Water mains IN G 3/4’ BSP (female)
2	Water mains OUT G 3/4’ BSP (female)
3	Thermistor connection
4	Flow (from EKHB(H/X)*) G 3/4’ BSP (female)
5	Return (to EKHB(H/X)*) G 3/4’ BSP (female)
6	Switchbox
7	Thermal protector
8	Anode
9	Cable entry: Power supply booster heater and thermal protection cable
10	Re-circulation connection G 3/4’ BSP (female)
11	Cable entry for EKSOLHWAV1: Power supply from EKHB(H/X)
12	Cable entry for EKSOLHWAV1: Power supply to EKSOLHWAV1 pump
13	Thermistor connection (see EKSOLHWAV1)
14	3 way valve

1.8 EKHWE150~300V3/Z2: Outlook and Dimensions - Service Space

Outlook and dimensions - Service space

The illustration below shows the outlook and the dimensions of the unit (mm)



1

Components

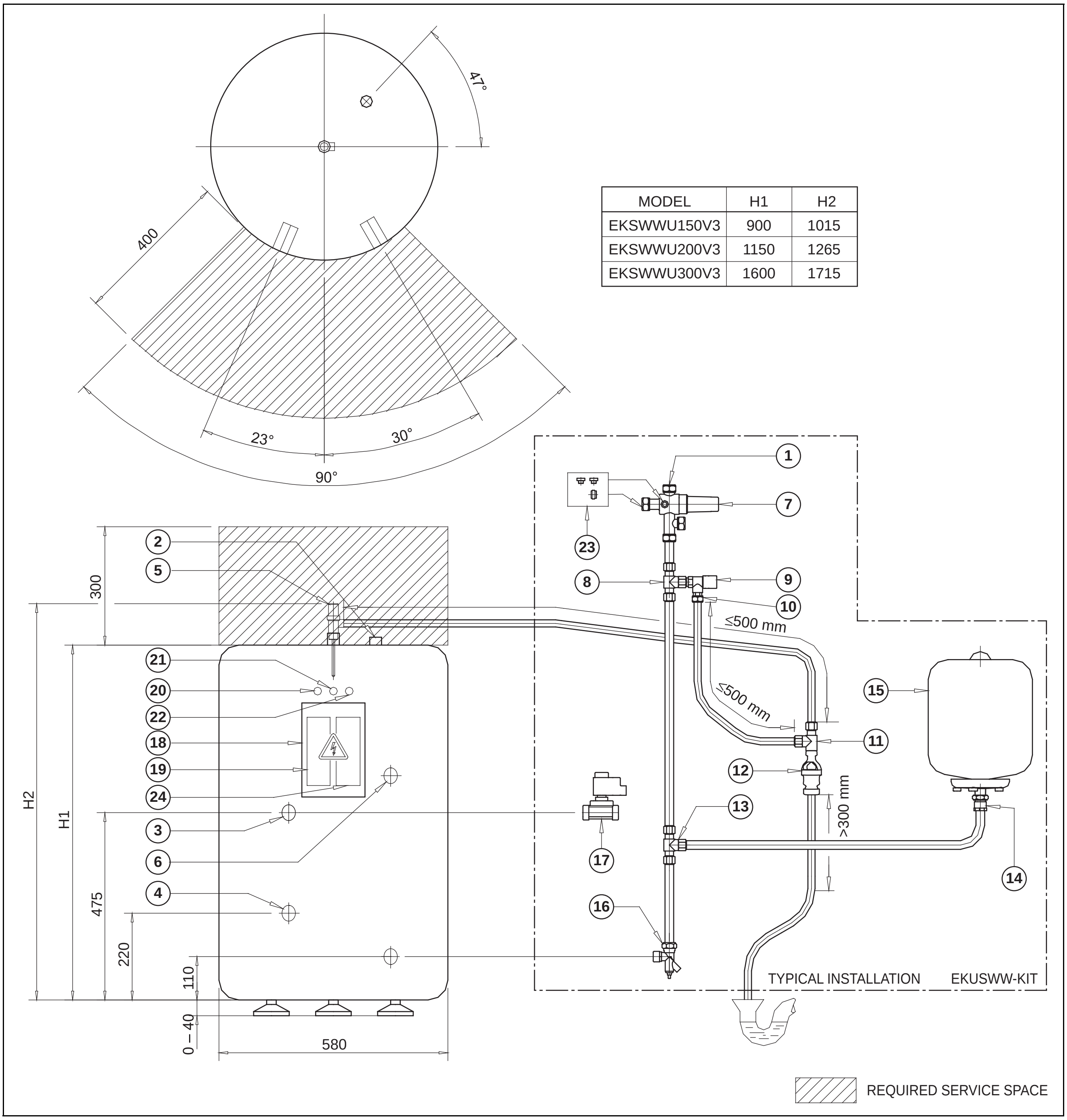
The table below contains the different components of the unit.

No.	Component
1	Cold water inlet: G 3/4 (male)
2	Hot water outlet: G 3/4 (male)
3	Thermistor hole
4	Flow (from EKHB(H/X)*): Rp 3/4 (female)
5	Return (to EKHB(H/X)*): Rp 3/4 (female)
6	Switchbox
7	Thermal protector
8	Anode
9	Cable entry
10	Re-circulation connection: G 3/4 (male)
11	Thermistor hole (see EKSOLHWAV1)
12	Wall plate 150L wall-mounted tank
13	Safety valve connection: G 1/2 (male)
14	3-way valve: 3x Rp 1 (female)

1.9 EKSWWU150~300V3: Outlook and Dimensions - Service Space

Outlook and dimensions - Service space

The illustration below shows the outlook and the dimensions of the unit (mm).



MODEL	H1	H2
EKSWWU150V3	900	1015
EKSWWU200V3	1150	1265
EKSWWU300V3	1600	1715

Components

The table below contains the different components of the unit.

No.	Water connections	Connection type
1	Water in (cold)	22 mm
2	Water out (hot)	3/4” female BSP
3	Flow from hydro-box	3/4” female BSP
4	Return to hydro-box	3/4” female BSP
5	Temperature relief valve	1/2” female BSP
6	Thermistor connection	

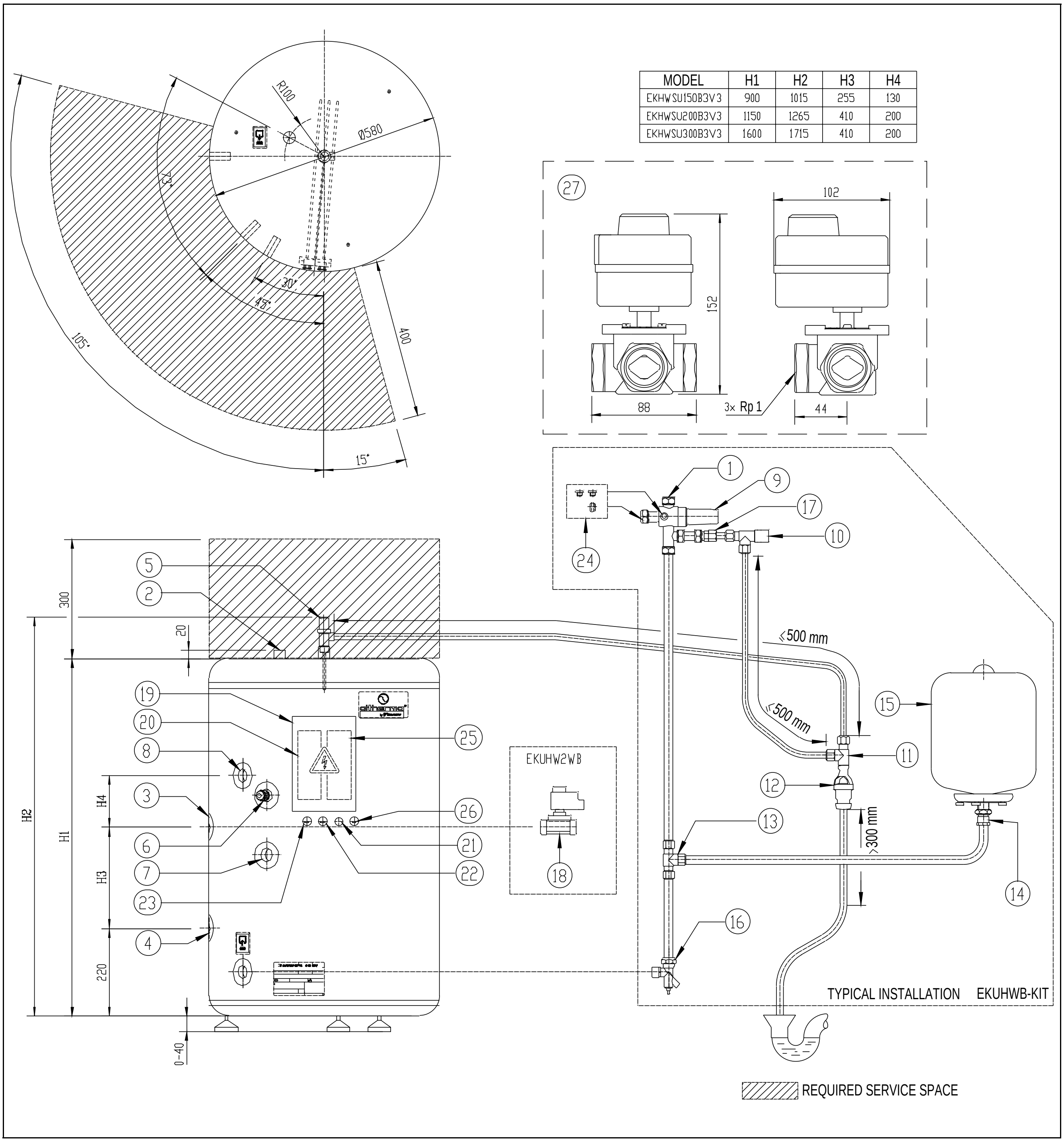
No.	Water connections kit	Connection type
7	Pressure reducing valve	22 mm - 22 mm
8	T-piece (expansion valve)	22 mm - 1/2” female BSP - 22 mm
9	Expansion relief valve	1/2” male BSP - 1/2” female BSP
10	Adapter (relief valve)	1/2” male BSP - 15 mm
11	T-piece (to tundish)	15 mm - 15 mm - 1/2” female BSP
12	Tundish	22 mm - 15 mm
13	T-piece (to expansion vessel)	22 mm - 22 mm - 22 mm
14	Adapter (expansion vessel)	22 mm - 3/4” female BSP
15	Expansion vessel	3/4” male BSP
16	Drain valve	22 mm - 3/4” male BSP
17	Solenoid valve	3/4” female BSP - 3/4” female BSP

No.	Other components
18	Switch box
19	Thermal protector 1
20	Cable entrance power, booster heater, thermal protector
21	Power entrance solenoid valve
22	Control cable solenoid valve
23	Blind stop + 2 plastic screw-on closing caps for pressure reducing valve
24	Thermal protector 2 + thermostat

1.10 EKHWSU150~300V3: Outlook and Dimensions - Service Space

Outlook and dimensions - Service space

The illustration below shows the outlook and the dimensions of the unit (mm)



1

Components

The table below contains the different components of the unit.

No.	Water connections	Connection type
1	Water in (cold)	22 mm
2	Water out (hot)	G 3/4 (female)
3	Flow from EKHB(H/X)*	G 3/4 (female
4	Return to EKHB(H/X)*	G 3/4 (female
5	Temperature relief valve	15 mm
6	Thermistor connection	-
7	Thermistor connection (see EKSOLHWAV1)	G 1/2 (female)
8	Re-circulation hole	G 3/4 (female)

No.	Water connections kit	Connection type
9	Pressure reducing valve	22 mm - 22 mm
10	Expansion relief valve	15 mm - 15 mm
11	T-piece (to tundish)	15 mm - 15 mm G 1/2 (female)
12	Tundish	22 mm - 15 mm
13	T-piece (to expansion vessel)	22 mm - 22 mm - 22 mm
14	Adapter (expansion vessel)	22 mm - G 3/4 (female)
15	Expansion vessel	G 3/4 (male)
16	Drain valve	22 mm - G 3/4 (female)
17	Reducing coupler	22 mm - 15 mm

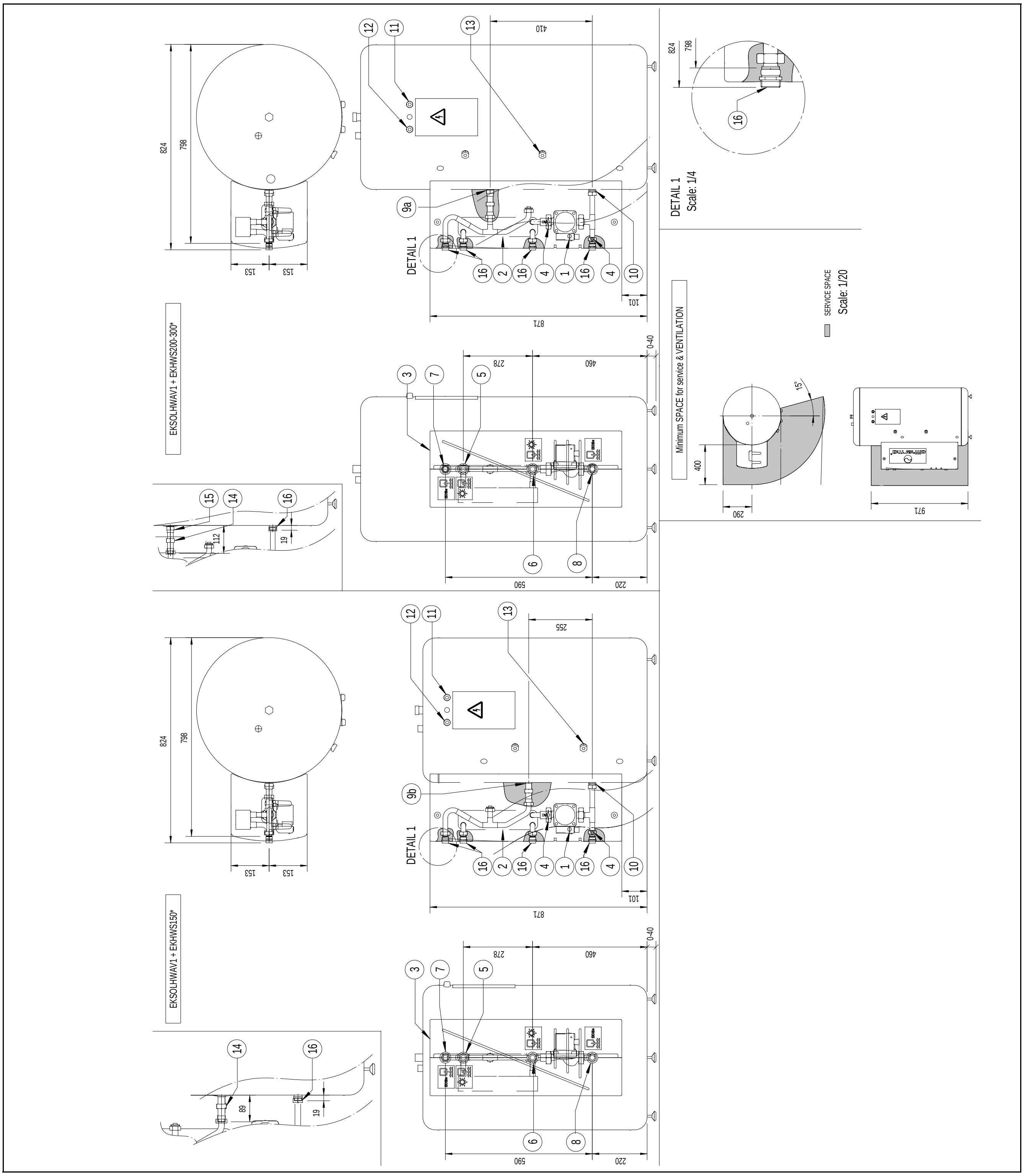
No.	Other components
18	EKUHW2WB Kit: Solenoid valve (only with EKSOLHWAV1) Rp 3/4 - Rp 3/4
19	Switchbox
20	Thermal protector 1 + thermostat
21	Cable entry: power supply booster heater and thermal protector cable
22	Cable entry for EKUHW2WB: Power supply to solenoid valve
23	Cable entry for EKSOLHWAV1 & EKUHW2WB: Power supply from EKHB(H/X)
24	Blind stop + 2 plastic screw-on closing caps for pressure reducing valve
25	Thermal protector 2 + Thermostat
26	Cable entry for EKSOLHWAV1: power supply to EKSOLHWAV1 pump
27	3 way valve 3x Rp1

1.11 EKSOLHWAV1~EKHWS*: Outlook and Dimensions - Service Space

1

Outlook and dimensions - Service space

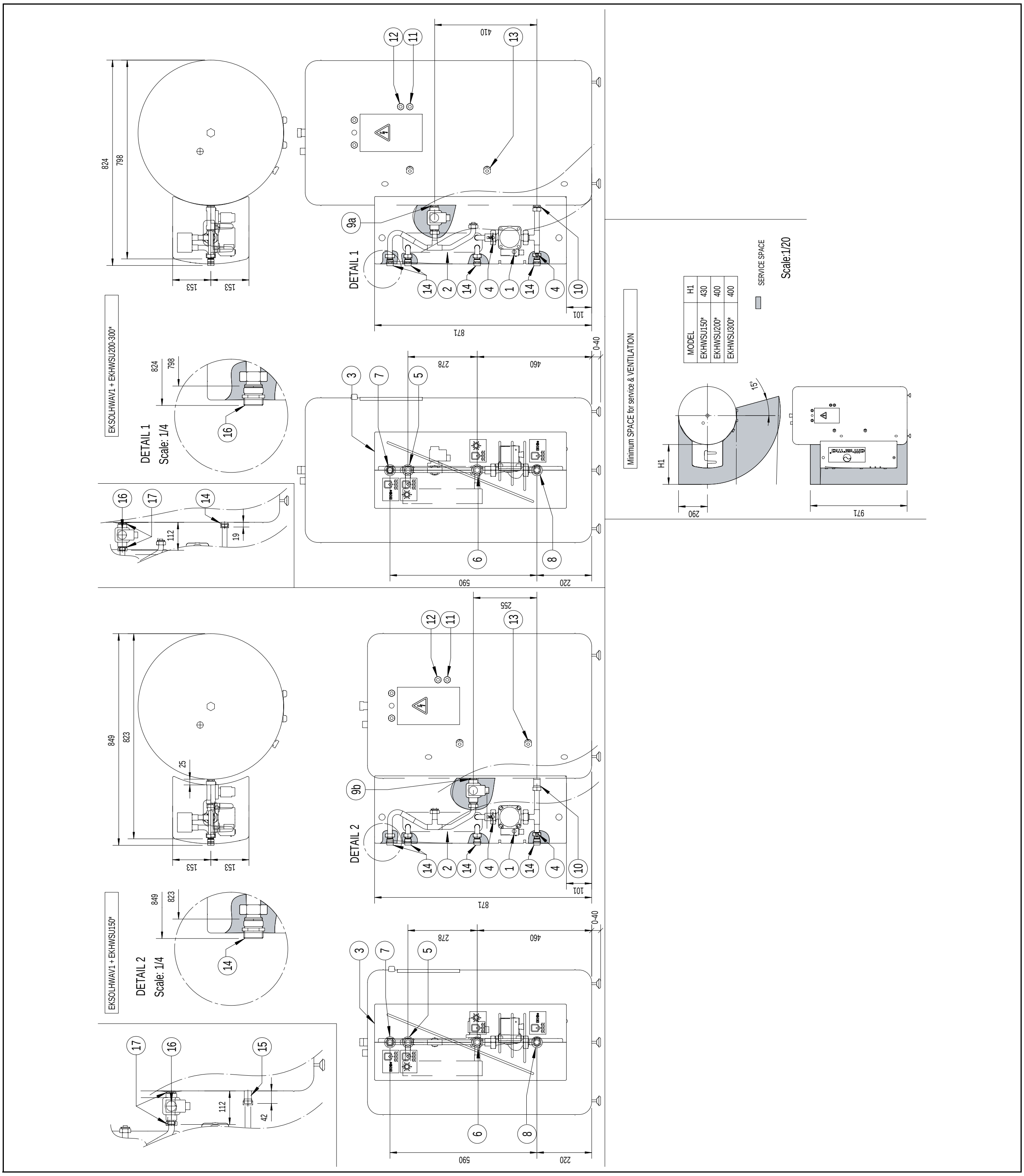
The illustration below shows the outlook and the dimensions of the unit (mm)



1.12 EKSOLHWAV1~EKHWSU*: Outlook and Dimensions - Service Space

Outlook and dimensions - Service space

The illustration below shows the outlook and the dimensions of the unit (mm)



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Components

The table below contains the different components of the unit.

No.	Components
1	Pump + switch for speed setting
2	Heat exchanger
3	EPP casing
4	Non return valves

No.	Connections	Connection type
5	Inlet connection from solar pump station	3/4” F BSP
6	Return connection to solar pump station	3/4” F BSP
7	Inlet connection from Altherma indoor unit	3/4” F BSP
8	Return connection to Altherma indoor unit	3/4” F BSP
9	EKSOLHWAV1 return connection to the domestic hot water tank heat exchanger	3/4” F BSP
9a	200-300l tank	
9b	150l tank	
10	EKSOLHWAV1 inlet connection from the domestic hot water tank heat exchanger	3/4” F BSP

No.	Switchbox domestic hot water tank
11	Cable entry (Altherma indoor unit)
12	Cable entry (Pump cable)

No.	Accessories (delivered with EKSOLHWAV1)	Connection type
13	Thermistor socket (thermistor solar pump station) (internal diameter 6.1 mm)	-
14	Adapter	3/4” M BSP - 3/4” M BSP

For EKSOLHWAV1~EKHWS*

No.	Other accessories (delivered with EKSOLHWAV1)	Connection type
15	Adapter	3/4” F BSP - 3/4” M BSP
16	Adapter	3/4” M BSP - 3/4” M BSP

For EKSOLHWAV1~EKHWSU*

No.	Field supply	Connection type
15	Adapter (field supply)	3/4” M BSP - 3/4” M BSP

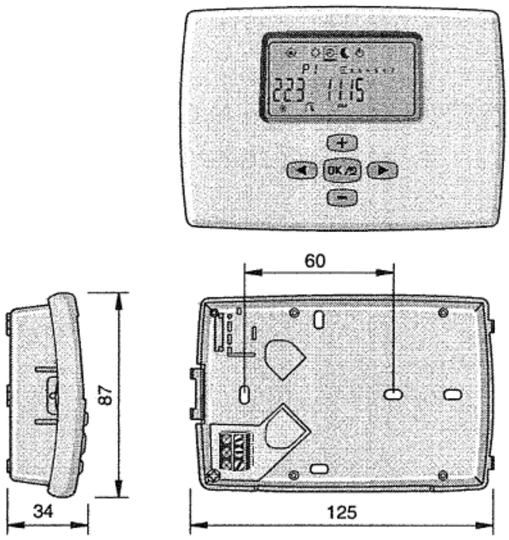
No.	EKUHWA-kit	Connection type
16	Solenoid valve	3/4” F BSP - 3/4” F BSP
17	Adapters (solenoid valve)	3/4” M BSP - 3/4” M BSP

1.13 EKRTR / EKRTW: Outlook and Dimensions

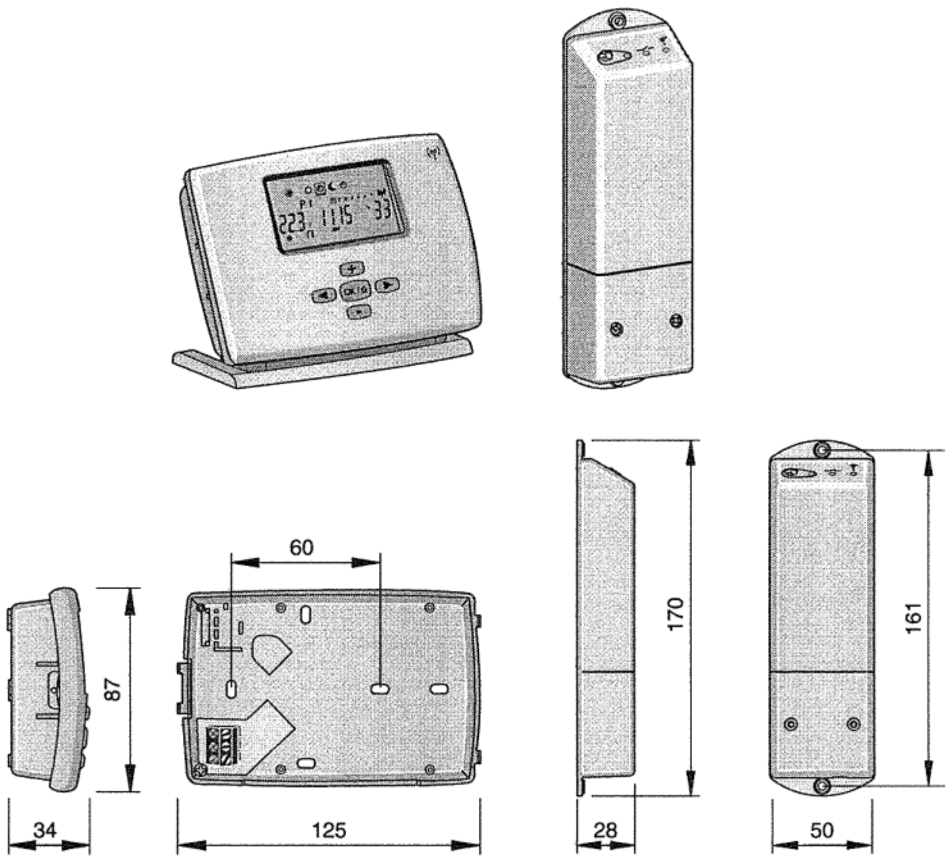
Outlook and dimensions

The illustrations below shows the outlook and the dimensions of the units (mm).

EKRTW



EKRTR



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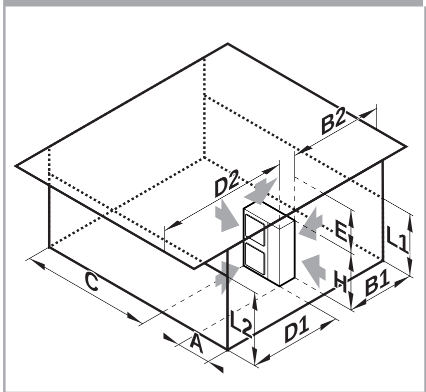
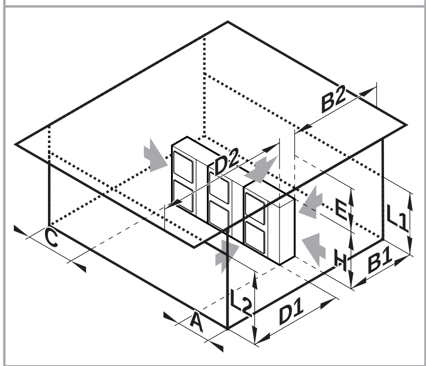
1.14 ERHQ011~016AAV3*/W1*: Installation and Service Space

Installing near a wall or obstacle

Where a wall or other obstacle is in the path of the outdoor unit air intake or exhaust airflow, follow the installation guidelines below (stacked, multiple row).

Not stacked

The illustrations and table below show the required installation and service space (mm).

								A	B1	B2	C	D1	D2	E	L1/L2	
	✓								≥100							
	✓		✓	✓				≥100	≥100		≥100					
	✓				✓				≥100				≤500	≥1000		
	✓		✓	✓	✓			≥150	≥150		≥150		≤500	≥1000		
		✓										≥500				
		✓			✓					≤500		≥500		≥1000		
	✓	✓				L1<L2			≥100			≥500				
						L2<L1			≥100			≥500				
	✓	✓			✓	L1<L2	L1≤H		≥250	≤500		≥750		≥1000	0<L1≤1/2H	1
												≥1000			0<L1≤1/2H	
							H<L1	L1≤H								
						L2<L1	L2≤H		≥100			≥1000	≥500	≥1000	0<L2≤1/2H	
									≥200						1/2H<L2≤H	
							H<L2	L2≤H								
	✓		✓	✓				≥200	≥300		≥1000					
	✓		✓	✓	✓			≥200	≥300		≥1000		≤500	≥1000		
		✓										≥1000				
		✓			✓					≤500		≥1000		≥1000		
	✓	✓				L1<L2			≥300			≥1000				
						L2<L1			≥250			≥1500			0<L2≤1/2H	
									≥300						1/2H<L2≤H	
	✓	✓			✓	L1<L2	L1≤H		≥300	≤500		≥1000		≥1000	0<L1≤1/2H	1
												≥1250			1/2H<L1≤H	
							H<L1	L1≤H								
						L2<L1	L2≤H		≥250			≥1500	≤500	≥1000	0<L2≤1/2H	2
									≥300						1/2H<L2≤H	
							H<L2	L2≤H								

Suction side obstacle

Discharge side obstacle

Left side obstacle

Right side obstacle

Top side obstacle

✓ Obstacle is present

1 In these cases, close the bottom of the installation frame to prevent discharged air from being bypassed

2 In these cases, only 2 units can be installed

This situation is not allowed

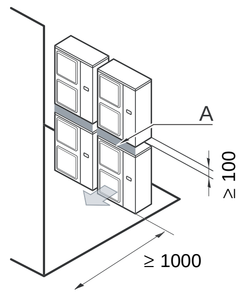
1

Stacked

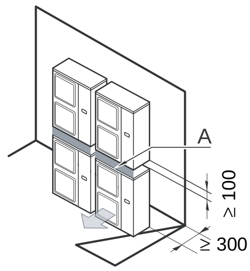
The illustration below shows the required installation and service space (mm).

- Do not stack more than one unit.
- +/- 100 mm is required as the dimension for laying the upper outdoor unit's drain pipe.
- Get the portion A sealed so that air from the outlet does not bypass.

1 Obstacles exist in front of the outlet side.



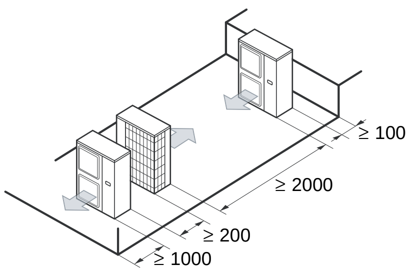
2 Obstacles exist in front of the air inlet.



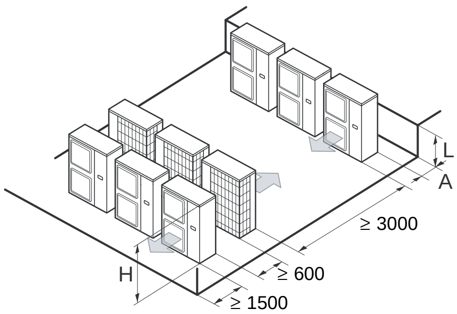
Multiple row

The illustration below shows the required installation and service space (mm).

1 Installing one unit per row.



2 Installing multiple units (2 units or more) in lateral connection per row.



Relation of dimensions of H, A and L are shown in the table below.

	L	A
L ≤H	0 < L ≤1/2H	250
	1/2H < L	300
H < L	Installation impossible	

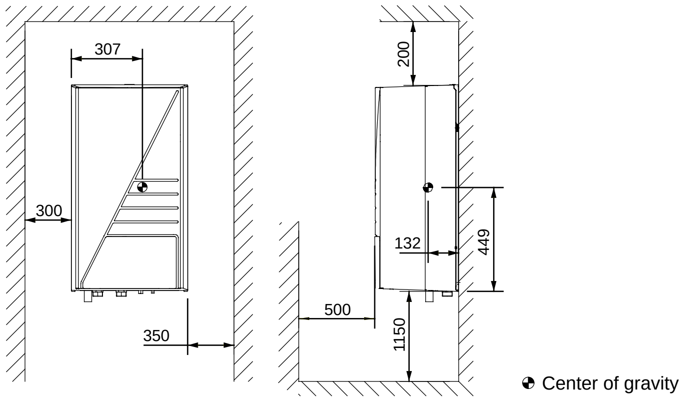
1

1.15 EKHBH(X)0016AA***: Installation and Service Space

EKHBH(X)

The illustration below shows the minimum service space for service and ventilation.

MINIMUM SPACE FOR SERVICE & VENTILATION

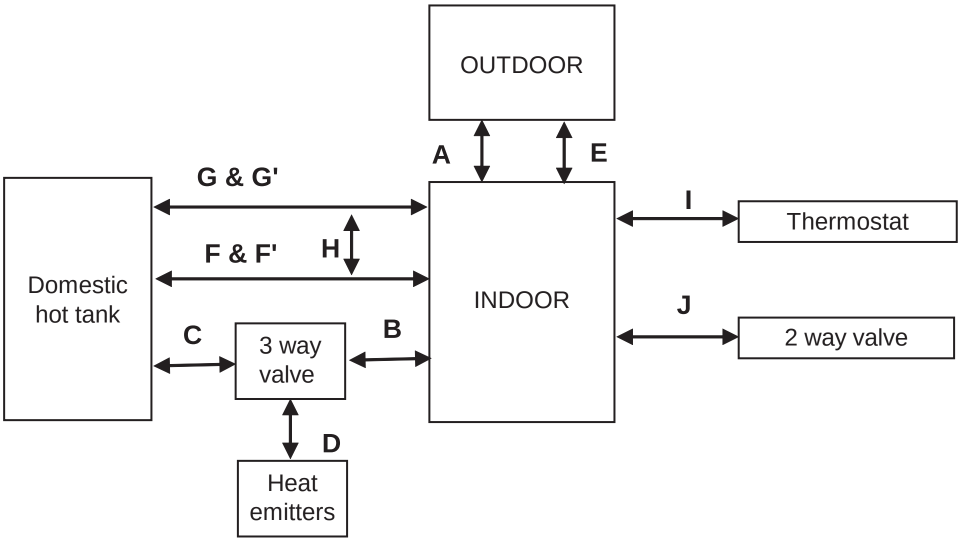


1

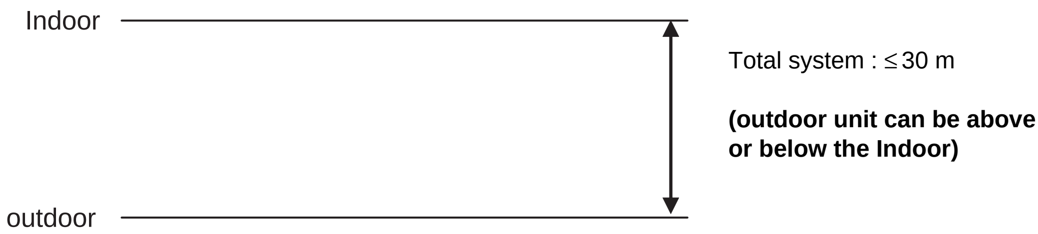
1.16 Physical Limitations and Limits of Operation

Distance between components

The illustrations and table below show the limitations.



Allowable height:



	Piping R410A	Piping water			Power supply		Communication				
	A	B	C	D	E	F & F'	G	G'	H	I	J
ERHQ011AAV3(8)	5* < **A** ≤ 75 m	≤ 3 m	≤ 10 m	depend on installation	depend on installation	depend on installation	12 m	depend on installation	> 0.05 m	depend on installation	depend on installation
ERHQ014AAV3(8)											
ERHQ016AAV3(8)											
ERHQ011AAW1(8)	3 < **A** ≤ 75 m										
ERHQ014AAW1(8)											
ERHQ016AAW1(8)											

1

Remark

- A: Minimum allowed length is 3 m. Refer to the installation manual of the outdoor unit.
  - V3(8) ONLY:

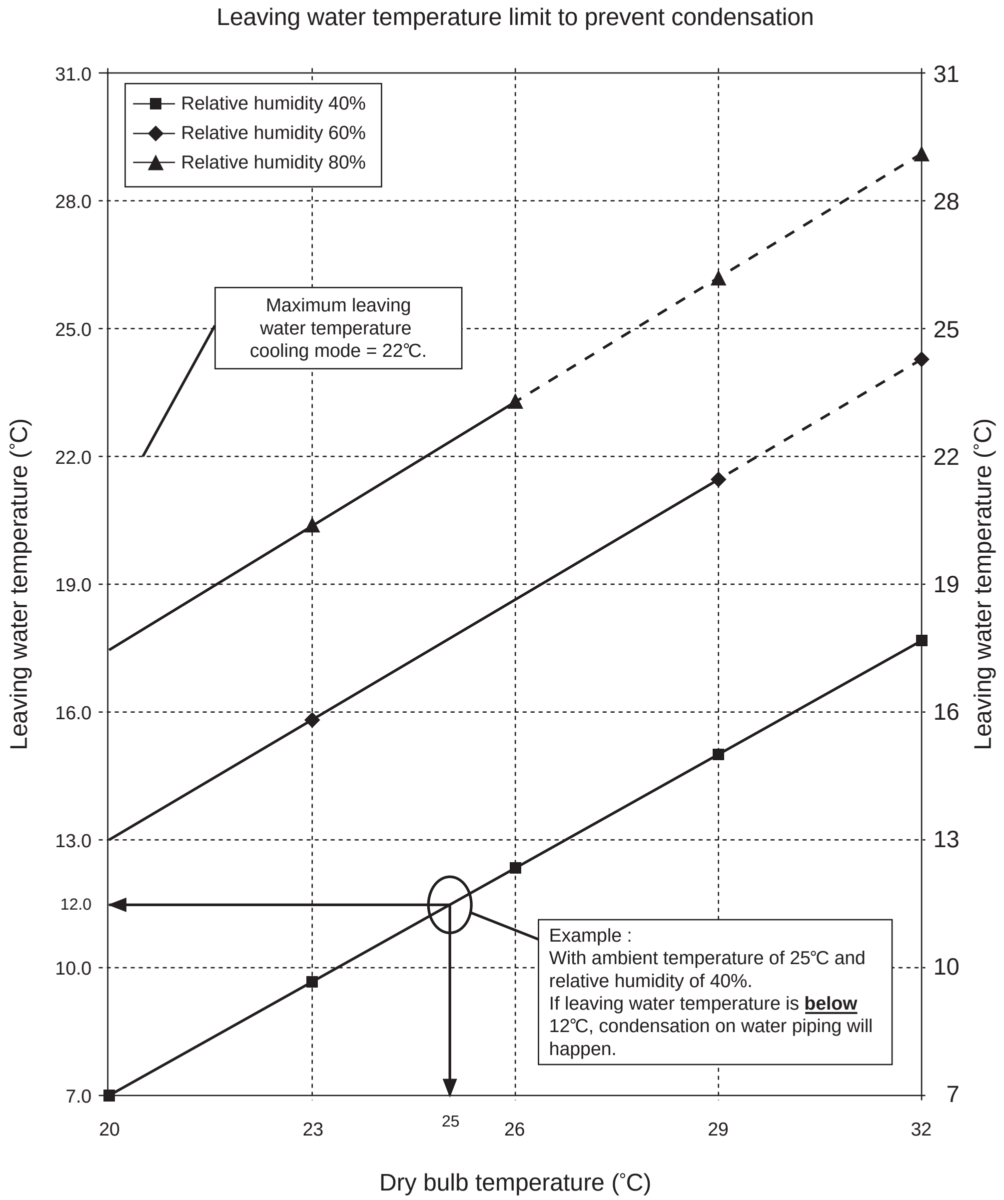
    When < 5 m, recharging of the outdoor unit is required.

    It is not necessary to charge additionally if the piping length is under 30 m
  - W1(8) ONLY:

    It is not necessary to charge additionally if the piping length is under 10 m
- E: 123-wiring in/outdoor
- F: Power supply booster + Q2L safety
- F': Power supply solenoid valve (UK only)
- G: Thermistor cable supplied with the domestic hot water tank is 12 m in length. May not be changed.
- G': Feedback signal Q2L & Q3L safety (UK only)

1.17 EKHBDP - Drainpan Kit Necessity

Decision graph for EKHBDP necessity



Remark

1. Refer to psychometric chart for more information.
2. If condensation is expected, installation of EKHBDP - drainpan kit must be considered.

2 Specifications

2.1 What Is in This Chapter?

Introduction

This chapter contains the following information:

- Technical specifications
- Electrical specifications

Altherma

This chapter contains the following specifications:

1

2.2 Technical and Electrical Specifications for ERHQ011~016AAV3

Technical specifications

The table below contains the technical specifications.

Specification			EKHBH*			EKHBX*		
			ERHQ011AA*	ERHQ014AA*	ERHQ016AA*	ERHQ011AA*	ERHQ014AA*	ERHQ016AA*
hydro-boxes			EKHBH016A**	EKHBH016A**	EKHBH016A**	EKHBX016A**	EKHBX016A**	EKHBX016A**
Casing	Colour		Ivory white					
	Material		Painted galvanised steel plate					
Dimensions	Packing	Height	1349 mm					
		Width	980 mm					
		Depth	420 mm					
	Unit	Height	1170 mm					
		Width	900 mm					
		Depth	320 mm					
Weight	Machine weight		103 kg					
	Gross weight		114 kg					
Packing	Material		EPS, Carton, Wood, PE (straps)					
	Weight		11 kg					
Heat exchanger	Specifications	Length	857 mm					
		Nr. of rows	2					
		Fin pitch	1.4 mm					
		Nr. of passes	6					
		Face area	0.98 m²					
		Nr. of stages	52					
		Empty tubeplate hole	0					
	Tube type		Hi-XSS(8)					
	Fin	Type	WF fin					
		Treatment	Anti-corrosion treatment (PE)					
Fan	Type		Propeller					
	Quantity		2					
	Air flow rate (nominal at 230 V)	Heating high	—	—	—	96 m³/min	100 m³/min	97 m³/min
		Cooling low	90 m³/min	90 m³/min	90 m³/min	90 m³/min	90 m³/min	90 m³/min
	Discharge direction		Horizontal					
	External statis pressure (Max)		—					
	Motor	Quantity	2					
		Model	Brushless DC motor					
		Position	—					
		Speed (nominal at 230 V) - number of steps	8					
		Speed (nominal at 230 V) - cooling	—	—	—	800 rpm	850 rpm	830 rpm
		Speed (nominal at 230 V) - heating	760 rpm	760 rpm	760 rpm	760 rpm	760 rpm	760 rpm
		Output	70 W					
		Drive	Direct drive					
Compressor	Quantity		1					
	Motor	Model	JT100G-VD					
		Type	Hermetically sealed scroll compressor					
		Speed	—					
		Motor output	2200 W					
		Starting method	Inverter driven					
		Crankcase heater	33 W					

Specification			EKHBH*			EKHBX*		
			ERHQ011AA*	ERHQ014AA*	ERHQ016AA*	ERHQ011AA*	ERHQ014AA*	ERHQ016AA*
hydro-boxes			EKHBH016A**	EKHBH016A**	EKHBH016A**	EKHBX016A**	EKHBX016A**	EKHBX016A**
Operation range	Heating	Min.	-20°C DB					
		Max.	35°C DB					
	Cooling	Min.	—			10 °C DB		
		Max.	—			46 °C DB		
	Domestic hot water	Min.	-20°C DB					
		Max.	43°C DB					
Sound level (nominal)	Heating	Sound power	—	—	—	64 dBA	64 dBA	66 dBA
		Sound pressure (1)	49 dBA	51 dBA	53 dBA	49 dBA	51 dBA	53 dBA
	Cooling	Sound power	—	—	—	64 dBA	66 dBA	69 dBA
		Sound pressure (1)	—	—	—	50 dBA	52 dBA	54 dBA
Sound level (night quiet)	Heating	Sound pressure	42 dBA	42 dBA	43 dBA	42 dBA	42 dBA	43 dBA
	Cooling	Sound pressure	—	—	—	45 dBA	45 dBA	46 dBA
Refrigerant	Type		R410A					
	Charge		3.7 kg					
	Control		Expansion valve (electronic type)					
	Nr. of circuits		1					
Refrigerant oil	Type		Daphne FVC68D					
	Charged volume		1.0 l					
Piping connections	Liquid	Quantity	1					
		Type	Flare connection					
		Diameter (OD)	9.52 mm					
	Gas	Quantity	1					
		Type	Flare connection					
		Diameter (OD)	15.9 mm					
	Drain	Quantity	3					
		Type	Hole					
		Diameter (OD)	26 mm					
	Piping length	Min. (2)	5 m					
		Max.	75 m					
		Equivalent	95 m					
		Chargeless	30 m					
	Additional refrigerant charge		See installation manual outdoor unit 4PW37976-1 B					
	Installation height difference max.		30 m					
	Heat insulation		Both liquid and gas pipes					
Defrost method			Pressure equalising					
Defrost control			Sensor for outdoor heat exchanger temperature					
Capacity control method			Inverter controlled					
Capacity control (%)			—					
Safety devices			High pressure switch					
			Fan motor thermal protector					
			Fuse					
Standard accessories	Item		Tie wraps					
	Quantity		2					
Standard accessories	Item		Installation manual					
	Quantity		1					

Notes

(1) The sound pressure level is measured via a microphone at a certain distance from the unit. It is a relative value depending on the distance and acoustic environment. Refer to sound spectrum drawing for more information.

(2) Down to 3 m with recharging of the outdoor unit. Refer to the installation manual of the outdoor unit.

1

Electrical specifications

The table below contains the electrical specifications.

Specification			**EKHBH***			**EKHBX***		
			ERHQ011AA*	**ERHQ014AA***	**ERHQ016AA***	**ERHQ011AA***	**ERHQ014AA***	**ERHQ016AA***
hydro-boxes			EKHBH016A**	EKHBH016A**	EKHBH016A**	EKHBX016A**	EKHBX016A**	EKHBX016A**
Power supply	Name		V3					
	Phase		1~					
	Frequency		50 Hz					
	Voltage		230 V					
Current	Nominal running current	Cooling	—					
		Heating	—					
	Starting current		—					
	Zmax	List	no requirements					
		Text	—					
	Maximum running current	Cooling	—	—	—	22.8 A	27.4 A	31.9 A
		Heating	—	—	—	—	—	—
	Recommended fuses		32 A					
Voltage range	Minimum		207 V					
	Maximum		253 V					
Wire connections	For power supply	Quantity						
		Remark	See installation manual outdoor unit 4PW37976-1 B					
	For connection with hydro-box	Quantity						
		Remark	See installation manual outdoor unit 4PW37976-1 B					
Power supply intake			Outdoor unit only					

1

2.3 Technical and Electrical Specifications for ERHQ011~016AAW1

Technical specifications

The table below contains the technical specifications.

Specification			Heating only type			Reversible type		
			ERHQ011AAW1	ERHQ014AAW1	ERHQ016AAW1	ERHQ011AAW1	ERHQ014AAW1	ERHQ016AAW1
indoor units			EKHBH016A**	EKHBH016A**	EKHBH016A**	EKHBX016A**	EKHBX016A**	EKHBX016A**
Casing	Colour		Ivory white					
	Material		Painted galvanised steel plate					
Dimensions	Packing	Height	1524 mm					
		Width	980 mm					
		Depth	420 mm					
	Unit	Height	1345 mm					
		Width	900 mm					
		Depth	320 mm					
Weight of unit	Machine net weight (ERHQ*W1*/ERHQ*W18*)		108/110 kg					
	Packed machine weight (ERHQ*W1*/ERHQ*W18*)		120/122 kg					
Weight of packing materi-als	Material		EPS, Carton, Wood, PE (straps)					
	Weight		12 kg					
Heat exchanger	Specifications	Length	857 mm					
		Nr. of rows	2					
		Fin pitch	1.4 mm					
		Nr. of passes	5					
		Face area	1.131 m²					
		Nr. of stages	60					
		Empty tubeplate hole	0					
	Tube type		Hi-XSS(8)					
	Fin	Type	WF fin					
		Treatment	Anti-corrosion treatment (PE)					
Fan	Type		Propeller					
	Quantity		2					
	Air flow rate (nominal at 230 V)	Cooling	-	-	-	-	-	-
		Heating	-	-	-	-	-	-
	Discharge direction		Horizontal					
	External static pressure (Max)		-					
	Motor	Quantity	2					
		Model	Brushless DC motor					
		Position	-					
		Speed (nominal at 230 V) - number of steps	8					
		Speed (nominal at 230 V) - cooling	—	—	—	780 rpm	780 rpm	780 rpm
		Speed (nominal at 230 V) - heating	760 rpm	760 rpm	760 rpm	760 rpm	760 rpm	760 rpm
		Output	70 W					
		Drive	Direct drive					
Compressor	Quantity		1					
	Motor	Model	JT1G-VDYR@T					
		Type	Hermetically sealed scroll compressor					
		Speed	-					
		Motor output	2200 W					
		Starting method	Inverter driven					
		Crankcase heater	33 W					

1

Specification			Heating only type			Reversible type		
			ERHQ011AAW1	ERHQ014AAW1	ERHQ016AAW1	ERHQ011AAW1	ERHQ014AAW1	ERHQ016AAW1
indoor units			EKHBH016A**	EKHBH016A**	EKHBH016A**	EKHBX016A**	EKHBX016A**	EKHBX016A**
Operation range	Heating	Min.	-20°C DB					
		Max.	35°C DB					
	Cooling	Min.	—			10 °C DB		
		Max.	—			46 °C DB		
	Domestic hot water	Min.	-20°C DB					
		Max.	43°C DB					
Sound level (nominal)	Heating (3)	Sound power	64 dBA	64 dBA	66 dBA	64 dBA	64 dBA	66 dBA
		Sound pressure (1)	51 dBA	51 dBA	52 dBA	51 dBA	51 dBA	52 dBA
	Cooling (4)	Sound power	64 dBA	66 dBA	69 dBA	64 dBA	66 dBA	69 dBA
		Sound pressure (1)	—	—	—	50 dBA	52 dBA	54 dBA
Sound level (night quiet)	Heating	Sound pressure	42 dBA	42 dBA	43 dBA	42 dBA	42 dBA	43 dBA
	Cooling	Sound pressure	—	—	—	45 dBA	45 dBA	46 dBA
Refrigerant	Type		R410A					
	Charge		2.95 kg					
	Control		Expansion valve (electronic type)					
	Nr. of circuits		1					
Refrigerant oil	Type		Daphne FVC68D					
	Charged volume		1.0 l					
Piping connections	Liquid	Quantity	1					
		Type	Flare connection					
		Diameter (OD)	9.52 mm					
	Gas	Quantity	1					
		Type	Flare connection					
		Diameter (OD)	15.9 mm					
	Drain	Quantity	4					
		Type	Hole					
		Diameter (OD)	3x26 / 1x18					
	Piping length	Min. (2)	5 m					
		Max.	75 m					
		Equivalent	95 m					
		Chargeless	10 m					
	Additional refrigerant charge		See installation manual outdoor unit 4PW42025-1					
	Installation height difference max.		30 m					
	Max. interunit level difference		-					
	Heat insulation		Both liquid and gas pipes					
Defrost method			Pressure equalising					
Defrost control			Sensor for outdoor heat exchanger temperature					
Capacity control method			Inverter controlled					
Capacity control (%)			—					
Safety devices			High pressure switch					
			Fan motor thermal protector					
			Fuse					
Standard accessories	Item		Tie wraps					
	Quantity		2					
Standard accessories	Item		Installation manual					
	Quantity		1					

Notes

(1) The sound pressure level is measured via a microphone at a certain distance from the unit. It is a relative value depending on the distance and acoustic environment. Refer to sound spectrum drawing for more information.

(2) Down to 3 m with recharging of the outdoor unit. Refer to the installation manual of the outdoor unit.

1

Electrical specifications

The table below contains the electrical specifications.

Specification			Heating only type			Reversible type		
			ERHQ011AAW1	ERHQ014AAW1	ERHQ016AAW1	ERHQ011AAW1	ERHQ014AAW1	ERHQ016AAW1
indoor units			EKHBH016A**	EKHBH016A**	EKHBH016A**	EKHBX016A**	EKHBX016A**	EKHBX016A**
Power supply	Name		W1*					
	Phase		3N~					
	Frequency		50 Hz					
	Voltage		400 V					
Current	Nominal running current	Cooling	—					
		Heating	5.8 A					
	Starting current (cooling/heating)		—					
	Zmax		-					
	Minimum S_{sc} value		-					
	Maximum running current (ERHQ*W1*/ERHQ*W18*)	Cooling	13.5/14					
		Heating						
	Recommended fuses		20 A					
Voltage range	Minimum		360 V					
	Maximum		440 V					
Wire connections	For power supply	Quantity						
		Remark	See installation manual outdoor unit 4PW42025-1					
	For connection with hydro-box	Quantity						
		Remark	See installation manual outdoor unit 4PW42025-1					
Power supply intake			Outdoor unit only					

2.4 Technical and Electrical Specifications for EKHBH016AA*** & EKHBX016AA*** and EKHBH016AB*** & EKHBX016AB***

Technical specifications

The table below contains the technical specifications.

Specification			EKHBH*			EKHBX*		
			EKHBH016AA*/AB*			EKHBH016AA*/AB*		
Outdoor units			ERHQ011AA	ERHQ014AA	ERHQ016AA	ERHQ011AA	ERHQ014AA	ERHQ016AA
Nominal input (indoor only without electric heater)			230 W					
Casing	Colour		RAL9010					
	Material		Epoxy polyester painted galvanised steel					
Dimensions	Packing	Height	1225 mm					
		Width	660 mm					
		Depth	610 mm					
	Unit	Height (1)	922 mm					
		Width	502 mm					
		Depth	361 mm					
Weight of unit	Machine net weigth		55 kg					
	Packed machine weight		65 kg					
Packing	Material		EPS, Wood, Carton, PP (straps)					
	Weight		10 kg					
Main components	Pump	Type	Water cooled					
		Nr. of speed	2					
		Nominal ESP unit Cooling	—	—	—	55.9 kPa	49.1 kPa	46.8 kPa
		Nominal ESP unit Heating	52.5 kPa	43.5 kPa	35.0 kPa	52.5 kPa	43.5 kPa	35.0 kPa
		Power input	210 W					
	Water side Heat exchanger	Type	Brazed plate					
		Quantity	1					
		Water volume	1.01 l					
		Water flow rate Min.	16 l/min					
		Water flow rate Nom. Cooling (2)	—	—	—	28.7 l/min	35.8 l/min	37.6 l/min
		Water flow rate Nom. Heating (3)	32.1 l/min	40.1 l/min	45.9 l/min	32.1 l/min	40.1 l/min	45.9 l/min
		Water flow rate Max. Cooling	58 l/min					
		Water flow rate Max. Heating	58 l/min					
		Insulation material	Polyurethane foam					
	Expansion vessel	Volume	10 l					
		Max. water pressure	3 bar					
		Pre-pressure	1 bar					
	Water filter	Diameter perforations	1 mm					
		Material	Brass					
Water circuit	Piping connections diameter		1-1/4" MBSP					
	Piping		1"-1/4					
	Safety valve		3 bar					
	Manometer		Yes					
	Drain valve / Fill valve		Yes					
	Shut off valve		Yes					
	Air purge valve		Yes					
	Total water volume (6)		5.5 l					
Refrigerant ciruit	Gas side diameter		15.9 mm					
	Liquid side diameter		9.52 mm					
Sound level	Sound pressure (4)		28 dBA					
	Sound power		—					

Specification			EKHBH*			EKHBX*		
			EKHBH016AA*/AB*			EKHBH016AA*/AB*		
Outdoor units			ERHQ011AA	ERHQ014AA	ERHQ016AA	ERHQ011AA	ERHQ014AA	ERHQ016AA
Operation range (ERHQ0** / AAV3*)	Ambient	Cooling	—			10~46°C		
		Heating	-20~35°C			-20~35°C		
	Waterside	Cooling	—			5~22°C		
		Heating[5]	15~55°C			15~55°C		
Operation range (ERHQ0** / AAW1*)	Ambient	Cooling	—			10~46°C		
		Heating[7]	-25~35°C			-25~35°C		
	Waterside	Cooling	—			5~22°C		
		Heating[5]	15~55°C			15~55°C		

Notes

[1] With option kit EKHBDP installed: Height = 936 mm

[2] Tamb 35°C - LWE 7°C (DT = 5°C)

[3] DB/WB 7°C/6°C - LWC 35°C (DT = 5°C)

[4] The sound pressure level is measured via a microphone at 1 m from the unit. It is a relative value depending on the distance and acoustic environment. The sound pressure level mentioned is valid for pump medium speed.

[5] 15°C~25°C: BUH only, no Heatpump operation = during commissioning

[6] Including piping + PHE + backup heater / excluding expansion vessel

[7] -25 ~ -20°C: operation of heat pump possible, but no guarantee of capacity (if outdoor temperature < -25°C unit will stop)

Electrical specifications

The table below contains the electrical specifications.

Electric heater (optional)	Type			3V3	6V3	6WN	6T1	9WN	9T1
	Power supply [1] [2]	Phase		1~	1~	3~	3~	3~	3~
		Frequency		50 Hz					
		Voltage		230 V	230 V	400 V	230 V	400 V	230 V
	Current	Running current		13 A	26 A	8.7 A	15.1 A	13 A	22.6 A
		Zmax	List	No requirements	—	No requirements	Out of scope	No requirements	Out of scope
			Text	—	0.25 + j0.15	—	—	—	—
		Zmax (electric heater) + booster heater (EKSWW* models)	List	—	—	No requirements	Out of scope	No requirements	Out of scope
			Text	0.25 + j0.15	0.15 + j0.09	—	—	—	—
Voltage range	Minimum			207 V	207 V	360 V	207 V	360 V	207 V
	Maximum			253 V	253 V	440 V	253 V	440 V	253 V
Wiring connections	For power supply backup heater	Quantity of wires		3G	3G	4G	4G	4G	4G
		Type of wires		Note [3]	Note [3]	Note [3]	Note [3]	Note [3]	Note [3]
	For power supply connection to optional DHW tank + Q2L	Quantity of wires		3G					
		Type of wires		Note [3] and [4]					
	For connection with R5T	Quantity of wires		Note [7]					
		Type of wires		Note [7]					
	For connection with A3P	Quantity of wires		Note [6]					
		Type of wires		Note [3] and [5]					
	For connection with M2S	Quantity of wires		3G					
		Type of wires		Note [3] and [5]					
	For connection with M3S	Quantity of wires		3G or 4G					
		Type of wires		Note [3] and [5]					

Notes

[1] Above mentioned power supply of the hydro-box is for the backup heater only.
The switch box & pump of the hydro-box are supplied via the outdoor unit.
The optional domestic warm water tank has a separate power supply.

[2] Optional electric heater has 2 capacity steps except for the 3V3 model which has only one capacity step.

[3] Select diameter and type according to national and local regulations.

[4] For more details of the voltage range and current refer to installation manual EKHBH/X016A**.

[5] Voltage: 230 V / Maximum current: 100 mA / Minimum 0.75 mm².

[6] Depends on thermostat type, refer to installation manual EKHBH/X016A**.

[7] Wire included in option EKSWW*/EKHWS*/EKHWE*.

1

2.5 Technical and Electrical Specifications for EKSWW150~300V3/Z2 & EKHWS150~300*V3/Z2

Technical specifications

The table below contains the technical specifications.

Specification			EKSWW150V3 EKHWS150*V3	EKSWW200V3 EKHWS150*V3	EKSWW300V3 EKHWS150*V3	EKSWW200Z2 EKHWS150*V3	EKSWW300Z2 EKHWS150*V3
Casing	Colour		Neutral white				
	Material		Epoxy-coated mild steel				
Dimensions	Packing	Height	950 mm	1200 mm	1650 mm	1200 mm	1650 mm
		Width	600 mm				
		Depth	600 mm				
	Unit	Height	900 mm	1150 mm	1600 mm	1150 mm	1600 mm
		Width	580 mm				
		Depth	580 mm				
Weight	Machine weight		37 kg	45 kg	59 kg	45 kg	59 kg
	Gross weight (EKSWW)		40 kg	49 kg	64 kg	49 kg	64 kg
	Gross weight (EKHWS)		42 kg	51 kg	66 kg	51 kg	66 kg
Packing	Material		EPS/Carton				
	Weight		3 kg	4 kg	5 kg	4 kg	5 kg
Main components	Tank	Water volume	150 l	200 l	300 l	200 l	300 l
		Material	Stainless steel (DIN 1.4521)				
		Max. temperature	85°C				
		Max. water pressure	10 bar				
		Insulation Material	Polyurethane foam				
		Insulation Min. thickness	40 mm				
	Heat exchanger	Quantity	1				
		Material (EKSWW)	Stainless steel (DIN 1.4401)				
		Material (EKHWS)	Duplex steel LDX 2101				
	Booster heater	Quantity	1				
		Capacity	3 kW				
Temperature sensor	Cable length		12 m				
Piping connections	Water inlet H/E Diameter		3/4” FBSP (inch)				
	Water outlet H/E Diameter		3/4” FBSP (inch)				
	Cold water in Diameter		3/4” FBSP (inch)				
	Hot water out Diameter		3/4” FBSP (inch)				

Electrical specifications

The table below contains the electrical specifications.

Specification			EKSWW150V3 EKHWS150*V3	EKSWW200V3 EKHWS150*V3	EKSWW300V3 EKHWS150*V3	EKSWW200Z2 EKHWS150*V3	EKSWW300Z2 EKHWS150*V3
Unit	Power supply	Phase	1~			2~	
		Frequency	50 Hz				
		Voltage	230 V			400 V	
	Nominal running current		13 A			7.5 A	
	Fuse	Size	20 A				
		Phase	1~			2~	

1

2.6 Technical and Electrical Specifications for EKSWWU150~300V3 & EKHWSU150~300*V3

Technical specifications

The table below contains the technical specifications.

Specification			EKSWWU150V3 EKHWSU150*V3	EKSWWU200V3 EKHWSU150*V3	EKSWWU300V3 EKHWSU150*V3
Casing	Colour		Neutral white		
	Material		Epoxy-coated mild steel		
Dimensions	Packing	Height	1040 mm	1280 mm	1735 mm
		Width	600 mm		
		Depth	600 mm		
	Unit	Height	1015 mm	1265 mm	1715 mm
		Width	580 mm		
		Depth	580 mm		
Weight	Machine weight		38 kg	46 kg	60 kg
	Gross weight (EKSWW)		41 kg	50 kg	65 kg
	Gross weight (EKHWS)		43 kg	52 kg	67 kg
Packing	Material		EPS/Carton		
	Weight		3 kg	4 kg	5 kg
Main components	Tank	Water volume	150 l	200 l	285 l
		Material	Stainless steel (DIN 1.4521)		
		Max. temperature	85°C		
		Max. water pressure	10 bar		
		Insulation Material	Polyurethane foam		
		Insulation Min. thickness	40 mm		
	Heat exchanger	Quantity	1		
		Material (EKSWW)	Stainless steel (DIN 1.4401)		
		Material (EKHWS)	Duplex steel LDX 2101		
	Booster heater	Quantity	1		
		Capacity	3 kW		
Temperature sensor	Cable length		12 m		
Piping connections	Water inlet H/E Diameter		3/4” FBSP (inch)		
	Water outlet H/E Diameter		3/4” FBSP (inch)		
	Cold water in Diameter		3/4” FBSP (inch)		
	Hot water out Diameter		3/4” FBSP (inch)		

Electrical specifications

The table below contains the electrical specifications.

Specification			EKSWWU150V3 EKHWSU150*V3	EKSWWU200V3 EKHWSU150*V3	EKSWWU300V3 EKHWSU150*V3
Unit	Power supply	Phase	1~		
		Frequency	50 Hz		
		Voltage	230 V		
	Nominal running current		13 A		
	Fuse	Size	20 A		
		Phase	1~		

1

2.7 Technical and Electrical Specifications for EKSOLHWAV1

Technical specifications

The table below contains the technical specifications.

Specification			EKSOLHWAV1
Dimensions	Packing	Height	795 mm
		Width	340 mm
		Depth	295 mm
	Unit	Height	770 mm
		Width	305 mm
		Depth	270 mm
Weight of unit	Machine weight		8 kg
	Gross weight		9 kg
Weight of packing materials	Material		Carton
	Weight		1 kg
Heat exchanger	Type		Brazed plate
	Pressure drop	Solar side	21.5 kPa
	Maximum inlet temperature	Solar side	110 °C
	Heat exchange capacity		1400 W/K
	Logarithmic mean temperature difference (LMTD)		5 K
Pump	Type		water cooled
	Number of speeds		3
	Nominal ESP	Heating	-
	Power input	Medium speed	46 W
	Water flow rate	Min.	-
		Max.	-
		Nom.	-
Sound	Sound pressure		27 dBA
Water circuit	Piping connection diameter		3/4" F BSP
Insulation material			EPP
Ambient temperature	Max.		35 °C
	Min.		1 °C

Electrical specifications

The table below contains the electrical specifications.

Specification			EKSOLHWAV1
Unit	Power supply	Phase	1~
		Frequency	50 Hz
		Voltage	220-240 V
	Nominal running current		Not applicable
	Fuse	Size	Not applicable
		Phase	Not applicable
Wiring connections	For power supply	Quantity	Not applicable
		Remark	Not applicable
	For connection with indoor	Quantity	Not applicable
		Remark	Not applicable
Voltage range	Minimum		-10%
	Maximum		+10%
Power supply intake			indoor unit

1

2.8 Technical and Electrical Specifications for EKRTW / EKRTR

Technical specifications

The table below contains the technical specifications.

Specification			EKRTW	EKRTR		EKRTETS
				Thermostat	Receiver	
Dimensions	Packing	Height (mm)	65	70		45
		Width (mm)	175	200		75
		Depth (mm)	100	140		75
	Unit	Height (mm)	87	87	170	3 m wire length
		Width (mm)	125	125	50	-
		Depth (mm)	34	34	28	-
Weight of unit	Net weight	g	215	210	125	65
	Gross weight	g	440	665		80
Weight of packing	Material		Carton	Carton	Carton	Carton
	Weight	g	55	85		15
Ambient temperature	Storage	°C	-20~60	-20~60	-20~60	-20~60
	Operation	°C	0~50	0~50	0~50	0~50
Temperature setpoint range heating		°C	4-37	4-37	-	-
Temperature setpoint range cooling		°C	4-37	4-37	-	-
Temperature setting resolution		°C	0,5	0,5	-	-
Clock			Yes	Yes	-	-
Regulation function			Proportional band	Proportional band	-	-
Features:						
Heating only			Yes	Yes	-	-
Heating and cooling			Yes	Yes	-	-
Comfort function mode (= comfort setpoint)			Yes	Yes	-	-
Reduced function mode (= night setback setpoint)			Yes	Yes	-	-
Scheduled function mode (= schedule timer)			Yes	Yes	-	-
Number of setpoint changes			12/day	12/day	-	-
Holiday function mode			Yes	Yes	-	-
Off function (with integrated frost protection)			Yes	Yes	-	-
Dew prevention			No	No	-	-
Setpoint limitation			Yes	Yes	-	-
Keylock function			Yes	Yes	-	-
Floor temperature protection			No	Yes (only in combination with EKRTETS)	-	-

Additional information

The table below contains additional information.

Comfort function mode	Use this mode for a fixed temperature on comfort level (comfort setpoint default on 21°C in heating mode, 24°C in cooling mode).
Reduced function mode	Use this mode for a fixed temperature on reduced level (reduced setpoint default on 17°C in heating mode, 28°C in cooling mode).
Scheduled function mode	Use this mode to let your installation be controlled by the schedule timer. The actions programmed in the schedule timer will be executed automatically according to the actual time. This function uses the scheduled temperature setpoint.
Holiday function mode	Use this mode to set a fixed temperature during a long absence.
Off function	Use this mode to switch off your installation. Integrated frost protection remains activated (frost protection default on 4°C in heating mode).
Setpoint limitation	Use this function to limit the setpoint range for the end customer.
Floor temperature protection	Use this function to set a maximum and a minimum floor temperature.

Electrical specifications

The table below contains the electrical specifications.

Specification			EKRTW	EKRTR		EKRTETS
				Thermostat	Receiver	
Power supply	Phase		-	-	1~	-
	Frequency	Hz	-	-	50	-
	Voltage	V	Battery powered 3x AA-LR6 (alka-line)	Battery powered 3x AA-LR6 (alka-line)	230	-
	Voltage tolerance		-	-	± 10%	-
Connection			Wired	Wireless	Wired	Wired
Max distance to receiver	Indoor		-	Approx. 30 m	-	-
	Outdoor		-	Approx. 100 m	-	-
Max rated switching current		A (at 230 VAC)	5 A	-	4 A	-

3 Functional Diagrams

3.1 What Is in This Chapter?

Introduction

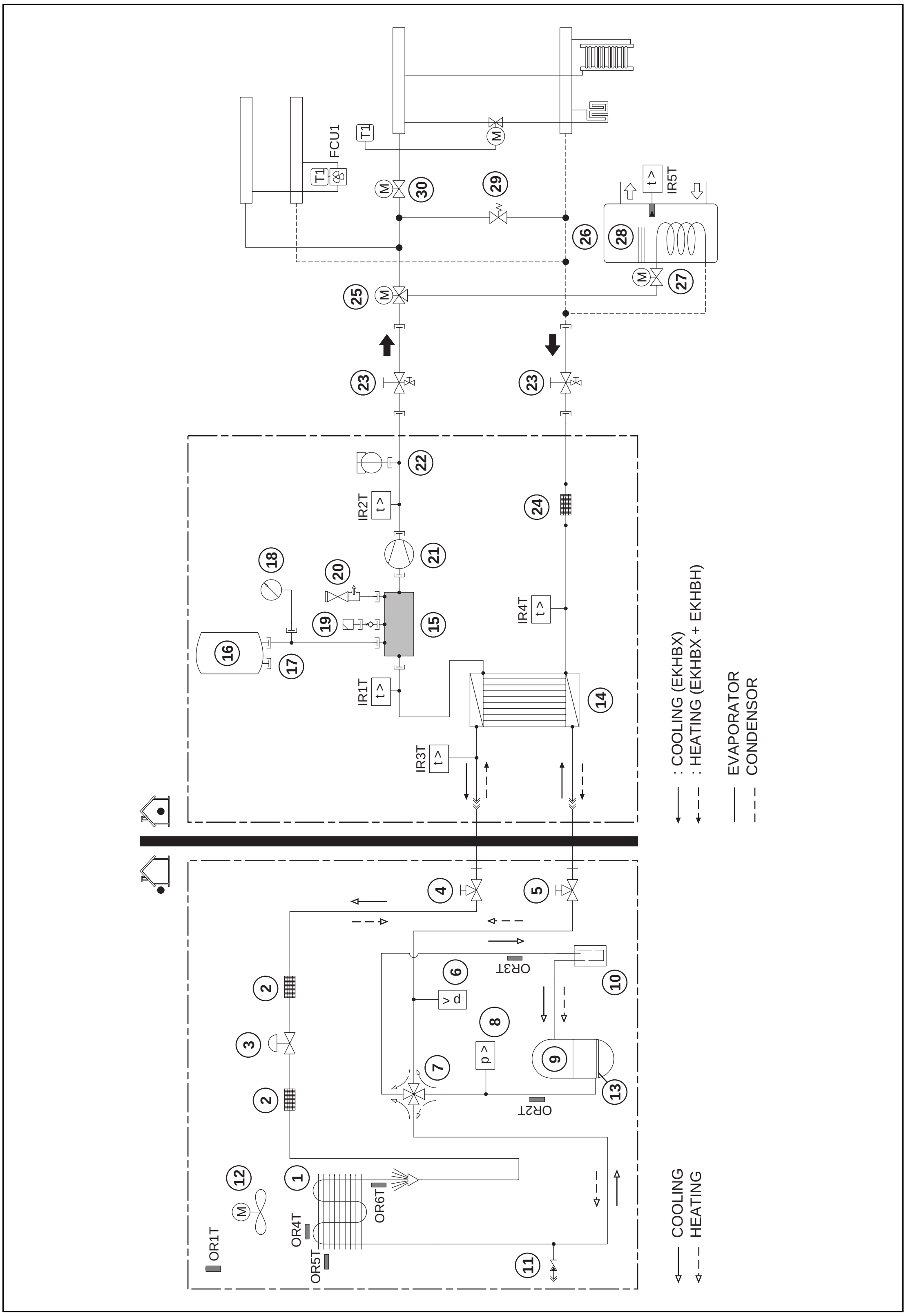
This chapter contains the following information:

- Overview complete system
- Electrical connection diagram
- Pipe connection diameters.

Functional diagrams

This chapter contains the following functional diagrams:

3.2 Complete System (ERHQ011~016AAV3 + EKHBH/X016AA*** + EKSWW)

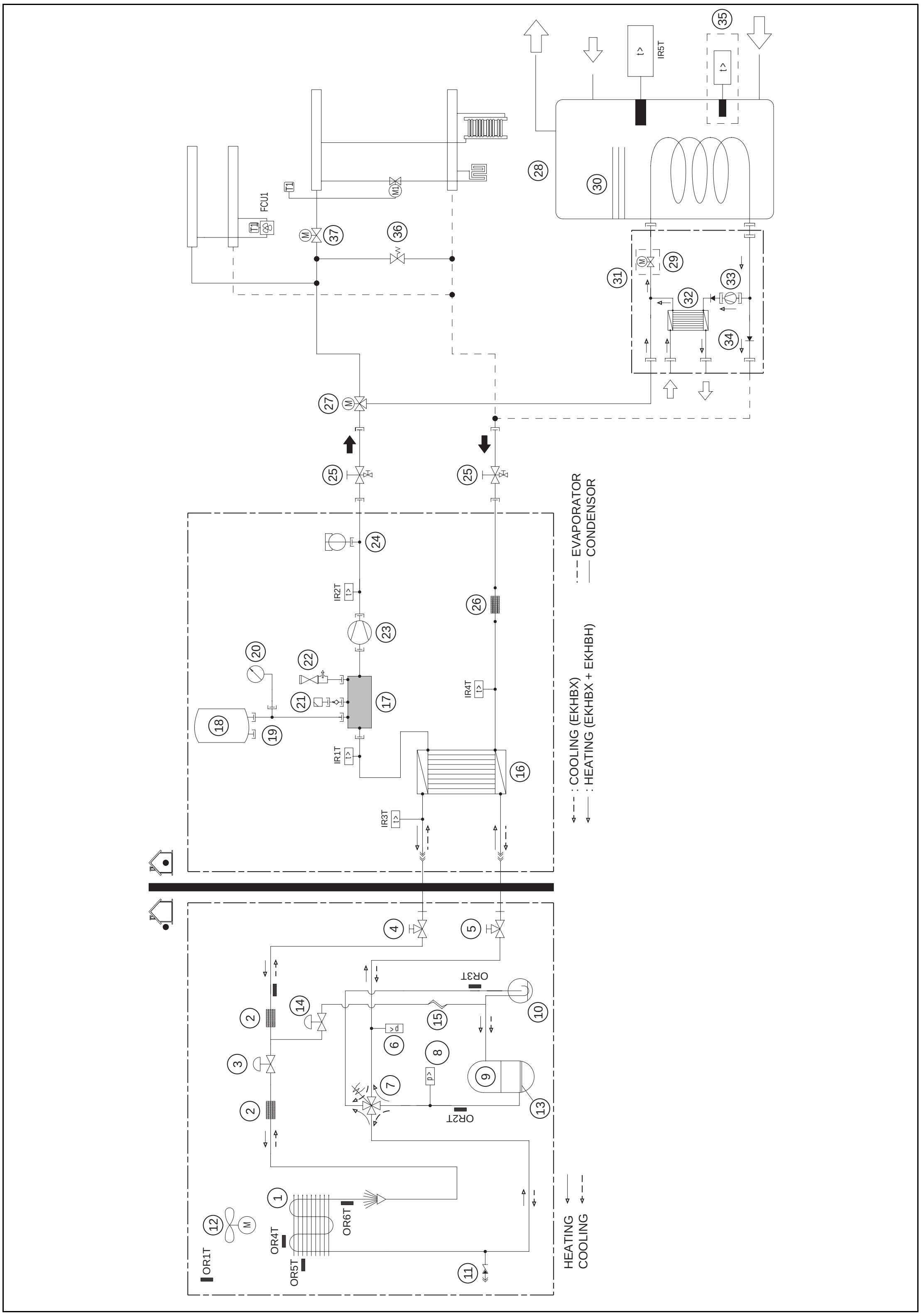


Components

The table below contains the different components of the functional diagrams.

No.	Name
Outdoor Unit	
1	Heat exchanger (Outdoor unit)
2	Filter (Outdoor, refrigerant)
3	Expansion valve
4	Liquid stop valve with service port
5	Gas stop valve with service port
6	Pressure sensor (Outdoor unit)
7	4-way valve ON: heating
8	High pressure switch discharge pipe (Outdoor unit)
9	Compressor
10	Accumulator
11	Service port 5/16”
12	Propeller fan
13	Crankcase heater compressor
OR1T	Outdoor air temperature thermistor
OR2T	Discharge pipe thermistor (Outdoor unit)
OR3T	Suction pipe thermistor (Outdoor unit)
OR4T	Heat exchanger thermistor (Outdoor unit)
OR5T	Heat exchanger middle thermistor (Outdoor unit)
OR6T	Liquid refrigerant thermistor (Outdoor unit)
Hydro-box	
14	Heat exchanger PME (hydro-box)
15	Backup heater
16	Expansion vessel
17	Drain valve
18	Manometer
19	Air purge valve
20	Pressure relief valve
21	Pump
22	Flow switch
23	Shut off valve with drain/fill valve
24	Filter (hydro-box, water)
IR1T	Outlet water Heat exchanger thermistor (hydro-box)
IR2T	Outlet water Backup heater thermistor (hydro-box)
IR3T	Liquid refrigerant thermistor (hydro-box)
IR4T	Inlet water thermistor (hydro-box)
IR5T	Domestic hot water tank thermistor (hydro-box)
DHW	
25	3-way valve for domestic hot water tank
26	DHW tank
27	2-way valve to block heating supply to tank heat exchanger (EKSWWU only)
28	Booster heater
Field supplied	
29	By-pass valve
30	2-way valve for cooling mode to block floor heating loops

3.3 Complete System (ERHQ011~016AAW1 + EKHBH/X016AB + EKHWS(U)/EKHWE)



Components

The table below contains the different components of the functional diagrams.

No.	Name
Outdoor Unit	
1	Heat exchanger (Outdoor unit)
2	Filter (Outdoor, refrigerant)
3	Expansion valve
4	Liquid stop valve with service port
5	Gas stop valve with service port
6	Pressure sensor (Outdoor unit)
7	4-way valve ON: heating
8	High pressure switch discharge pipe (Outdoor unit)
9	Compressor
10	Accumulator
11	Service port 5/16”
12	Propeller fan
13	Crankcase heater compressor
OR1T	Outdoor air temperature thermistor
OR2T	Discharge pipe thermistor (Outdoor unit)
OR3T	Suction pipe thermistor (Outdoor unit)
OR4T	Heat exchanger thermistor (Outdoor unit)
OR5T	Heat exchanger middle thermistor (Outdoor unit)
OR6T	Liquid refrigerant thermistor (Outdoor unit)
Hydro-box	
14	Injection valve
15	Capillary tube
16	Heat exchanger PME (hydro-box)
17	Backup heater
18	Expansion vessel
19	Drain valve
20	Manometer
21	Air purge valve
22	Pressure relief valve
23	Pump
24	Flow switch
25	Shut off valve with drain/fill valve
26	Filter (hydro-box, water)
IR1T	Outlet water Heat exchanger thermistor (hydro-box)
IR2T	Outlet water Backup heater thermistor (hydro-box)
IR3T	Liquid refrigerant thermistor (hydro-box)
IR4T	Inlet water thermistor (hydro-box)
IR5T	Domestic hot water tank thermistor (hydro-box)
DHW	
27	3-way valve for domestic hot water tank
28	DHW tank
29	2-way valve to block heating supply to tank heat exchanger (EKHWSU + EKSOLHWAV1 only)
30	Booster heater
31	Solar kit (EKSOLHWAV1)
32	Heat exchanger PME (Solar kit)

No.	Name
33	Solar kit pump (with one-way integrated)
34	One-way valve
35	Thermistor from solar station (field supply)
Field supplied	
36	By-pass valve
37	2-way valve for cooling mode to block floor heating loops

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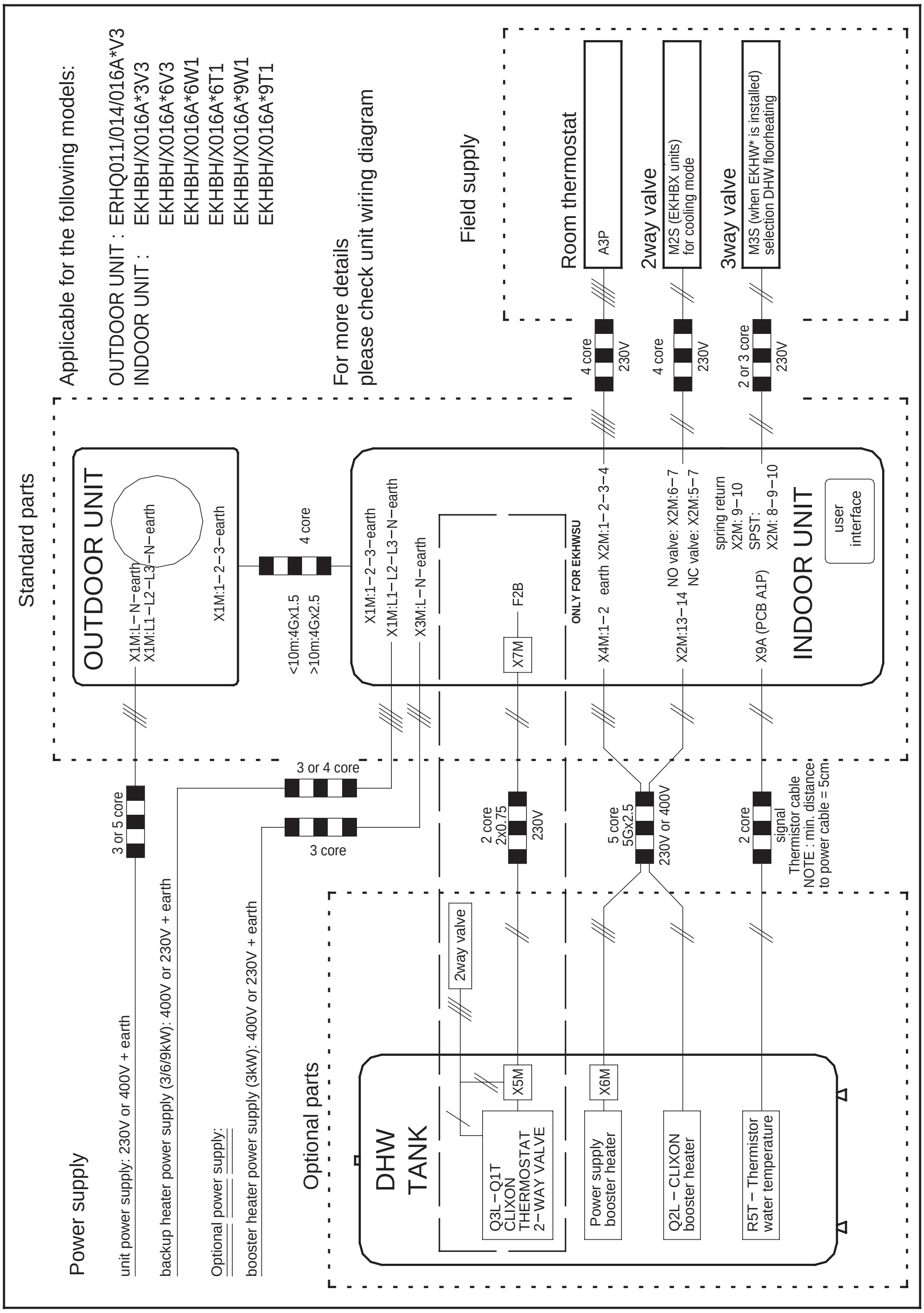
3.4 Electrical Connection Diagram



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3.5 Pipe Connection Diameters

Outdoor units

The table below contains the refrigerant pipe connection diameters.

Model	∅ Gas pipe (flare)	∅ Liquid pipe (flare)
ERHQ011AAV3*/W1*	15.9 mm	9.52 mm
ERHQ014AAV3*/W1*		
ERHQ016AAV3*/W1*		

hydro-box

The table below contains the refrigerant pipe connection diameters.

Model	∅ Gas pipe (flare)	∅ Liquid pipe (flare)
EKHBH016A*	15.9 mm	9.52 mm
EKHBX016A*		

hydro-box + water side

The table below contains the water inlet/outlet connection diameters.

Model	∅ Inlet pipe	∅ Outlet pipe
EKHBH016A*	1-1/4 inch (MBSP)[1]	1-1/4 inch (MBSP)
EKHBX016A*		
EKSWW(U)150	3/4 inch (FBSP)[2]	3/4 inch (FBSP)
EKSWW(U)200		
EKSWW(U)300		
EKHWS(U)150	3/4 inch (FBSP)[2]	3/4 inch (FBSP)[2]
EKHWS(U)200		
EKHWS(U)300		
EKHWE150	Rp[3] 3/4 inch (female)	Rp[3] 3/4 inch (female)
EKHWE200		
EKHWE300		

Hot + cold water side

Model	∅ Cold water	∅ Hot water	∅ Re-circulation connection
EKHWS(U)150	3/4 inch (FBSP)[2]	3/4 inch (FBSP)[2]	3/4 inch (FBSP)[2]
EKHWS(U)200			
EKHWS(U)300			

Model	∅ Cold water	∅ Hot water	∅ Re-circulation connection
EKHWE150	G[4] 3/4 inch (male)	G[4] 3/4 inch (male)	G[4] 3/4 inch (male)
EKHWE200			
EKHWE300			

1: MBSP = male British standard pipe

2: FBSP = female British standard pipe

3: Rp = internal parallel (ISO 7)

4: G = external + internal parallel (ISO 228)

4 Piping Diagrams

4.1 What Is in This Chapter?

Introduction

This chapter contains the following information:

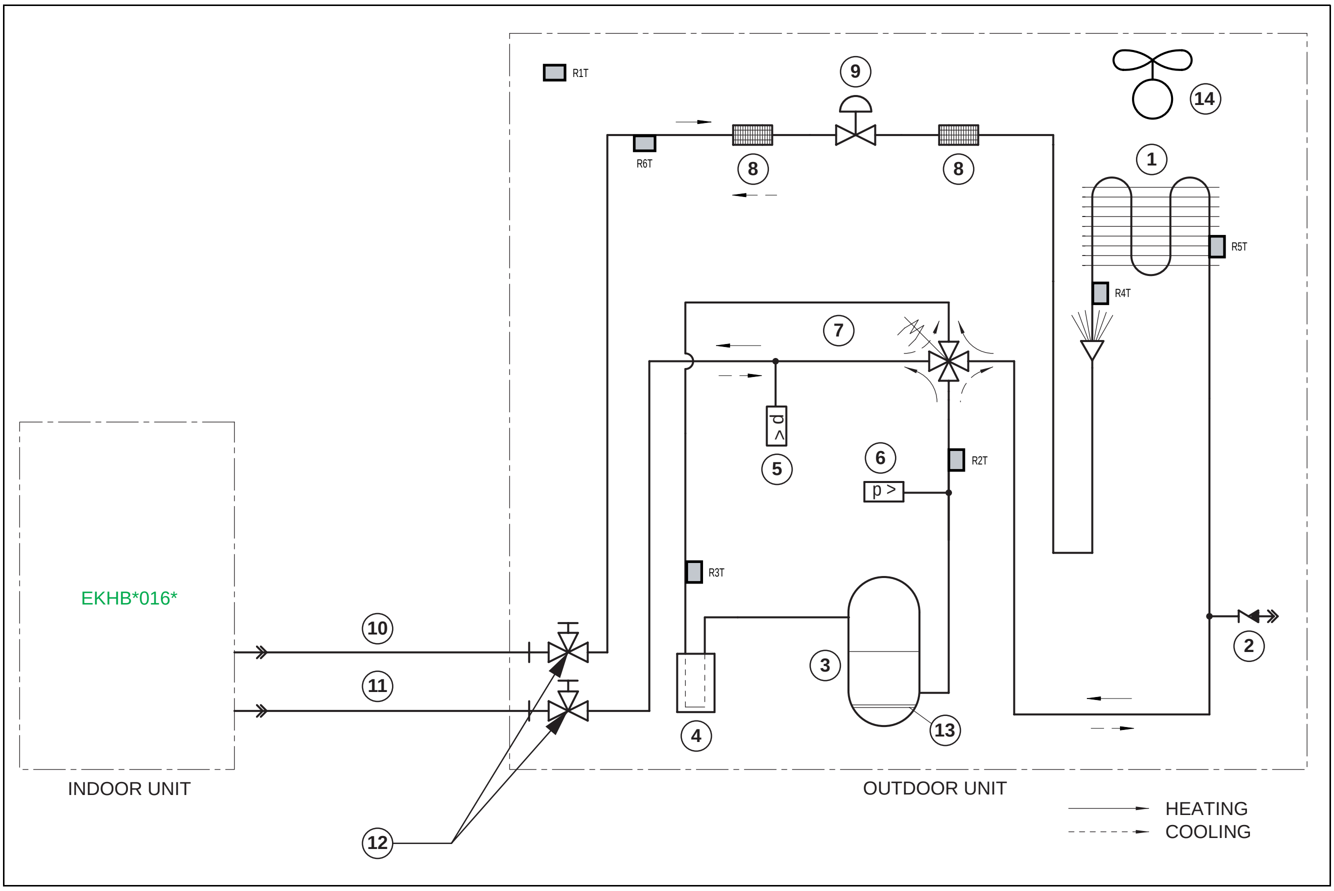
- Piping diagrams

Piping diagrams

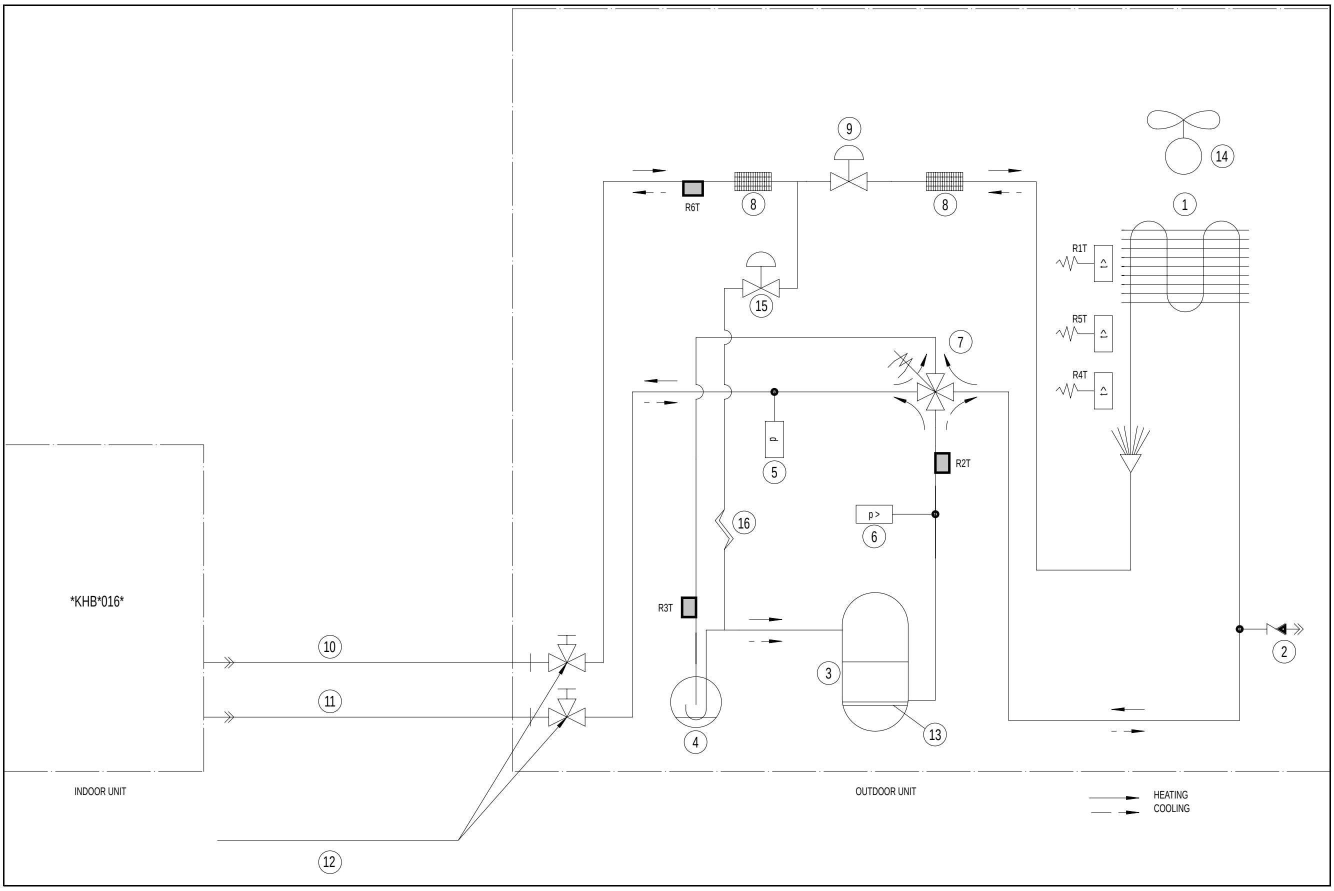
This chapter contains the following piping diagrams:

1

4.2 Piping Diagram for ERHQ011~016AAV3(8)



4.3 Piping Diagram for ERHQ011~016AAW1(8)



Components

The table below contains the different components of the functional diagrams.

No.	Name	
1	Heat exchanger	-
2	Service port 5/16”	-
3	Compressor	M1C
4	Accumulator	-
5	Pressure sensor	S1NPH
6	High pressure switch	S1PH
7	4-way valve	Y1S
8	Filter	-
9	Electronic expansion valve	Y1E
10	Field piping ϕ9.5 C 1220T-0	-
11	Field piping ϕ15.9 C 1220T-0	-
12	Stop valve (with service port 5/16” flare)	-
13	Crank case heater	E1HC
14	Fan motor	M1F-M2F
15	Injection valve	Y3S
16	Capillary tube	-
R1T	Thermistor (AIR)	
R2T	Thermistor (Discharge)	

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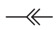
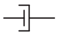
No.	Name	
R3T	Thermistor (suction)	
R4T	Thermistor (heat exchanger)	
R5T	Thermistor (heat exchanger middle)	
R6T	Thermistor (liquid)	

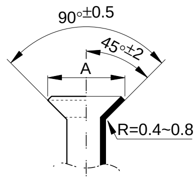
Symbols

The table below contains the different symbols used on the functional diagrams.

Symbol	Name
	Check valve
	Flare connection
	Screw connection
	Flange connection
	Pinched pipe
	Spinned pipe

Caution for flare connection

- Refer to table below for correct flare dimensions and tightening torques. Too high tightening force may cause refrigerant leak because of flare cracking:

Piping size	Flare nut tightening torque	A dimensions for processing flares (mm)	Flare shape
ϕ6.4	14.2~17.2 N•m (144~176 kgf•cm)	8.7~9.1	
ϕ9.5	32.7~39.9 N•m (333~407 kgf•cm)	12.8~13.2	
ϕ12.7	49.5~60.3 N•m (504~616 kgf•cm)	16.2~16.6	
ϕ15.9	61.8~75.4 N•m (630~770 kgf•cm)	19.3~19.7	
ϕ19.1	97.2~118.6 N•m (989.8~1208 kgf•cm)	23.6~24.0	

- When connecting the flare nut, apply refrigerating machine oil to the flare (inside and outside) and first screw the nut 3 or 4 turns by hand. Coat the indicated surfaces using ether or ester oil:

- After completing the installation, carry out an inspection of the piping connections by pressure test using nitrogen.

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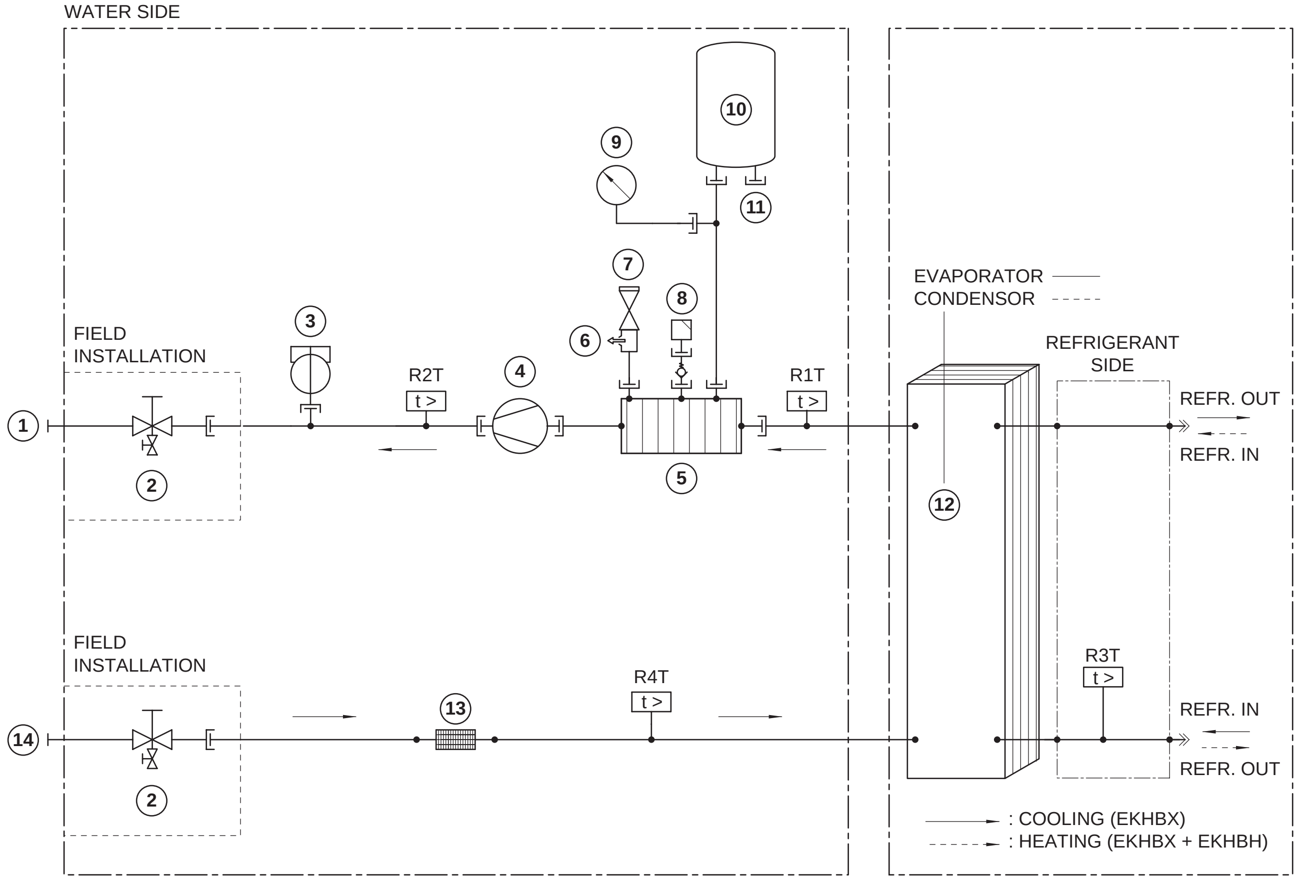
4.4 Piping Diagram for EKHBH(X)016A***



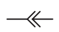
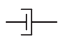
Components

The table below contains the different components of the functional diagrams.

No.	Name
1	Water outlet
2	Shut off valve with drain/fill valve
3	Flowswitch
4	Pump
5	Back-up heater
6	Blow off
7	Safety valve
8	Air purge
9	Pressure gauge
10	Expansion vessel
11	Drain
12	Plate heat exchanger
13	Filter
14	Water inlet
R1T	Outlet water heat exchanger thermistor
R2T	Outlet water backup heater thermistor
R3T	Refrigerant liquid side thermistor
R4T	Inlet water thermistor

Symbols

The table below contains the different symbols used on the functional diagrams.

Symbol	Name
	Check valve
	Flare connection
	Screw connection
	Flange connection
	Pinched pipe
	Spinned pipe

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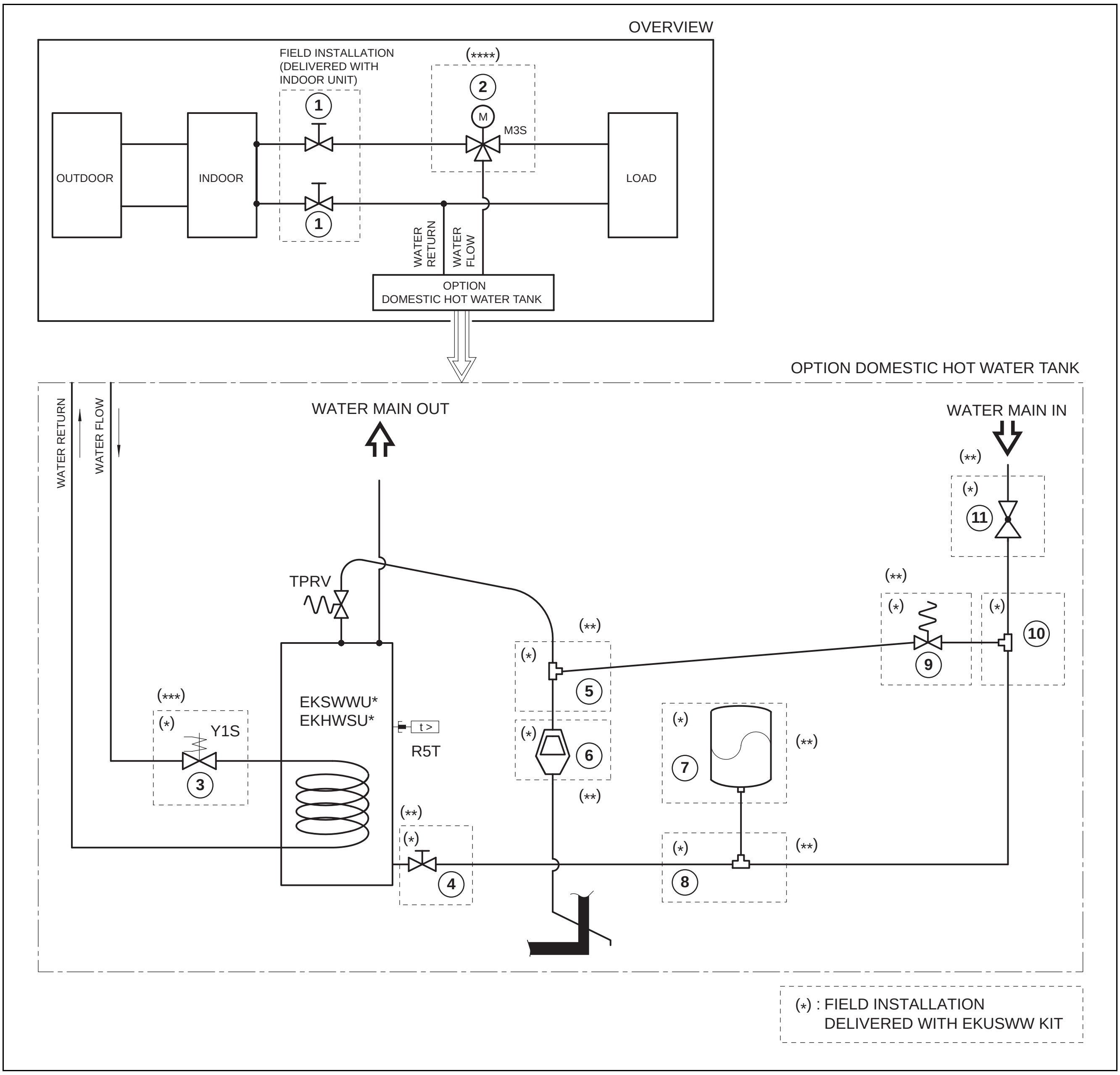
4.5 Piping Diagram for EKSWWU150~300V3



Components

The table below contains the different components of the functional diagrams.

No.	Name
1	Shut off valve
2	3-way motorized valve (M3S) (****)
3	2-way solenoid valve (Y1S) (*) (***)
4	Drain valve (*) (**)
5	T-piece (*) (**)
6	Tundish (*) (**)
7	Expansion vessel (*) (**)
8	T-piece (*) (**)
9	Expansion relief valve (*) (**)
10	T-piece (*)
11	Pressure reducing valve with integrated non return valve line strainer (*) (**)
R5T	Domestic hot water thermistor

(*): Field installation delivered with EKUSWW kit / EKUHWA kit

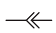
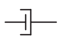
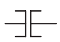
(**): Field installation delivered with EKUHWB kit

(***): Field installation delivered with EKUHW2B kit (only with EKSOLHWAV1)

(****): Field installation: - EKSWWU*: field supplied
- EKHWSU*A*: field supplied
- EKHWSU*B*: delivered with EKHWSU*B*

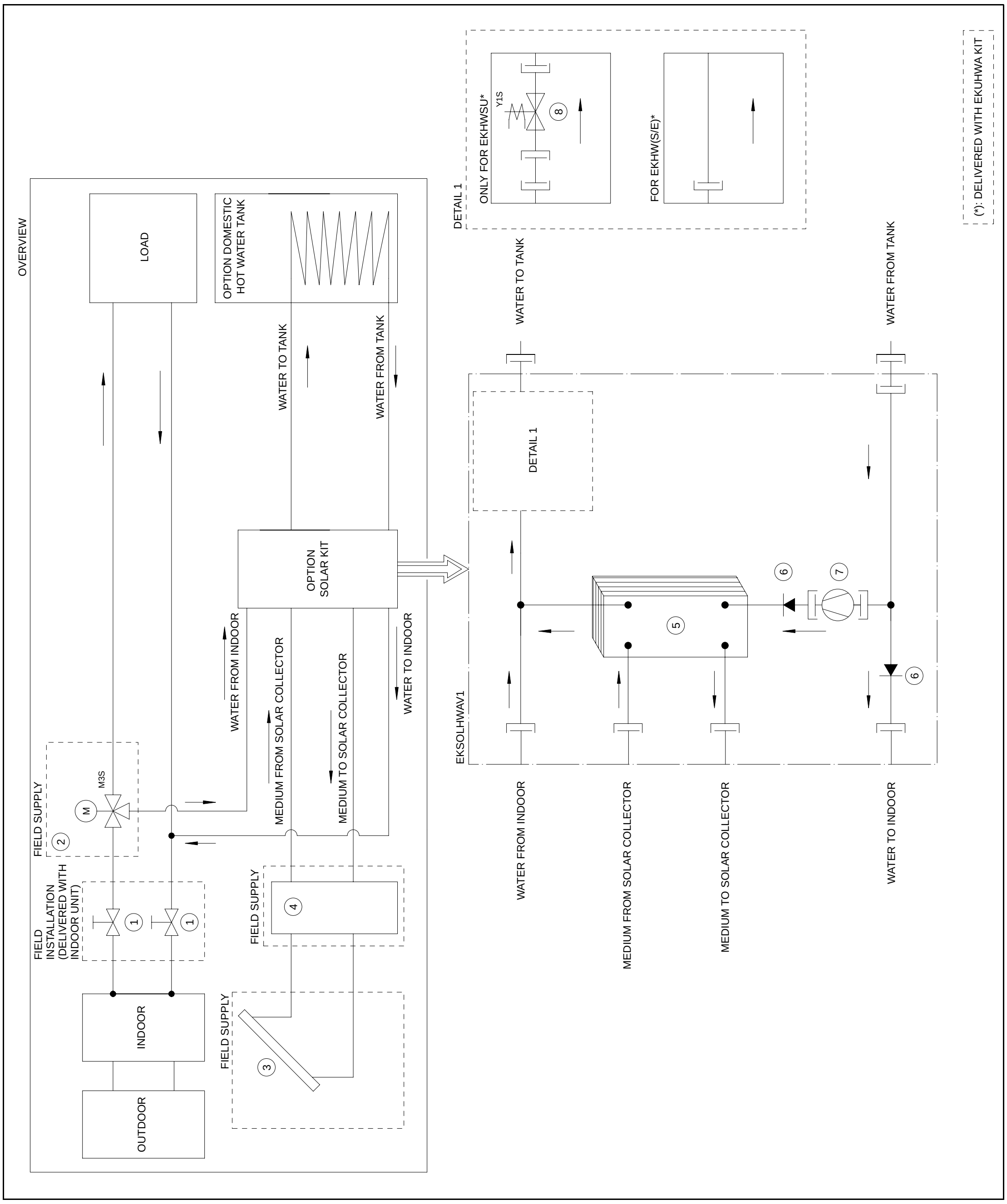
Symbols

The table below contains the different symbols used on the functional diagrams.

Symbol	Name
	Check valve
	Flare connection
	Screw connection
	Flange connection
	Pinched pipe
	Spinned pipe

1

4.6 Piping Diagram for EKSOLHWAV1



Components

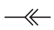
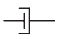
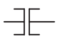
The table below contains the different components of the functional diagrams.

No.	Name
1	Shut off valve
2	3-way motorized valve
3	Solar collector
4	Solar pump station
5	Plate heat exchanger
6	Non return valve
7	Pump
8	2-way solenoid valve (*)
Y1S	Solenoid valve
M3S	3-way motorized valve

(*): Delivered with EKUHWA kit

Symbols

The table below contains the different symbols used on the functional diagrams.

Symbol	Name
	Check valve
	Flare connection
	Screw connection
	Flange connection
	Pinched pipe
	Spinned pipe

5 Switch Box Layout

5.1 What Is in This Chapter?

Introduction

This chapter shows the switch box components.

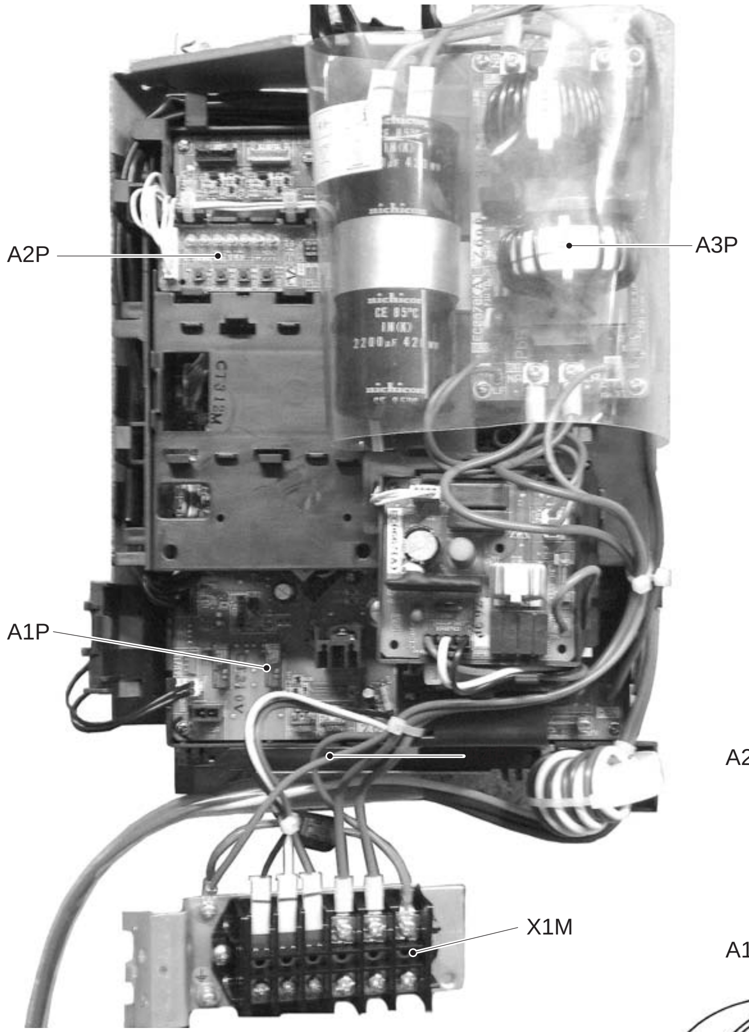
Altherma

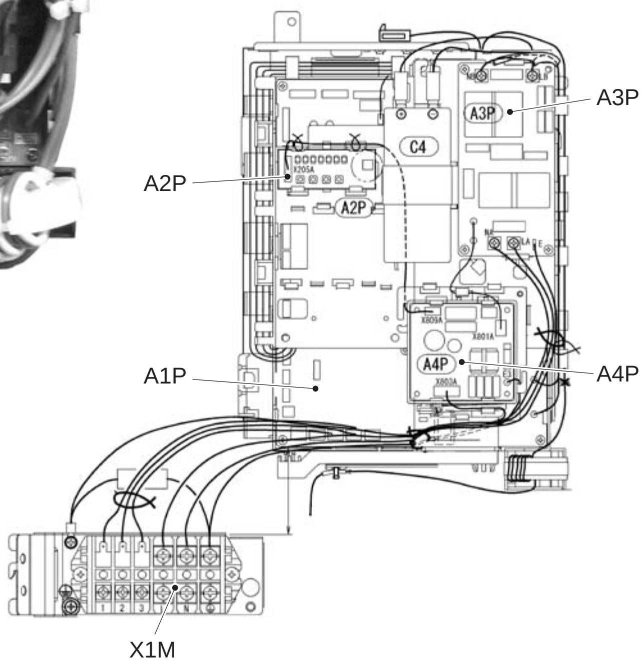
This chapter contains the following switch box layouts:

1

5.2 Switch Box Layout for ERHQ011~016AAV3

The illustration below shows the outdoor switch box layout:



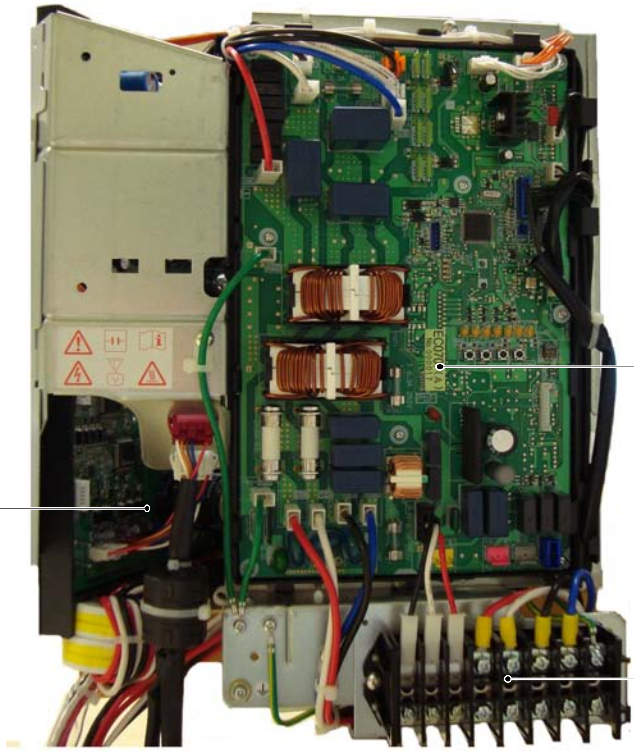


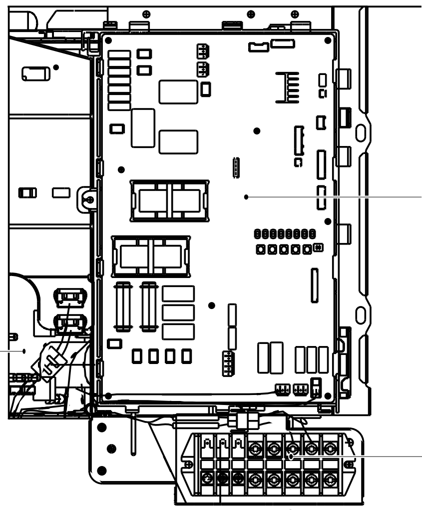
Item	Description
A1P	Printed circuit board (control)
A2P	Printed circuit board (service)
A3P	Printed circuit board (noise filter)
A4P	Printed circuit board (communication)
X1M	Terminal strip

5.3 Switch Box Layout for ERHQ011~016AAW1

FRONT

The illustration below shows the outdoor switch box layout:



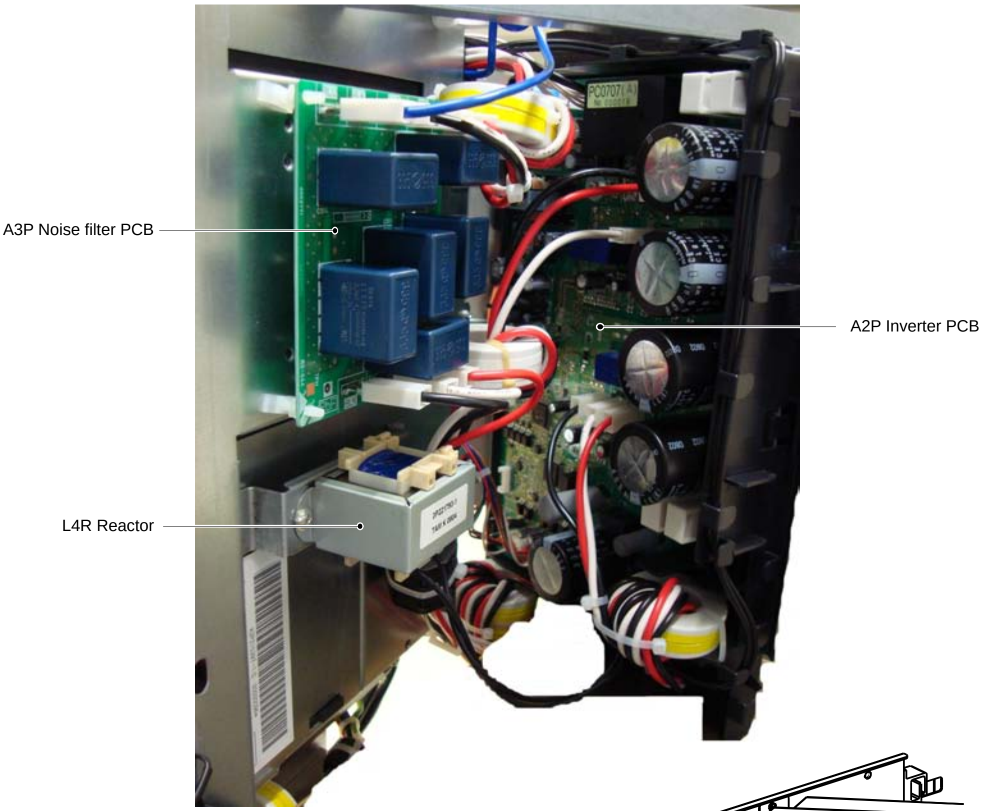


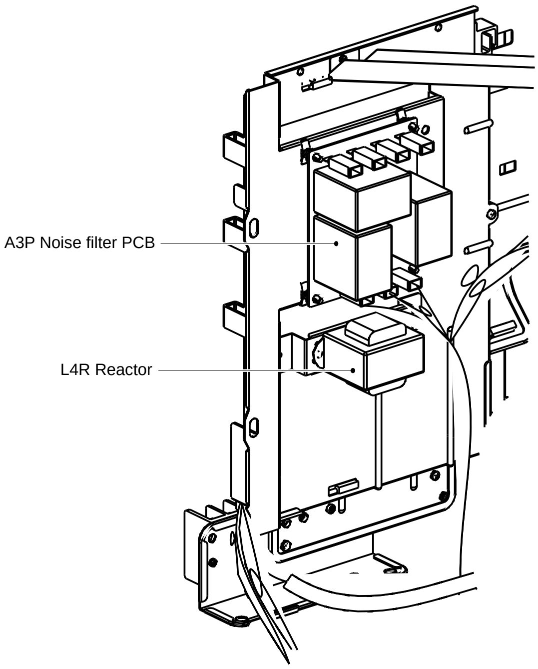
Item	Description
A1P	Printed circuit board (control)
A2P	Printed circuit board (inverter)
X1M	Terminal strip

1

BACK

The illustration below shows the outdoor switch box layout:

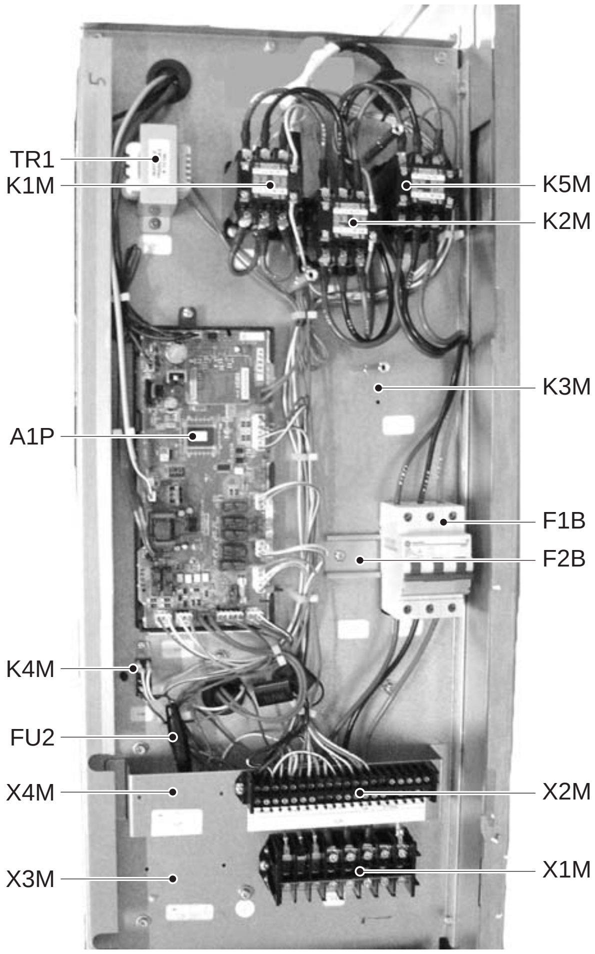


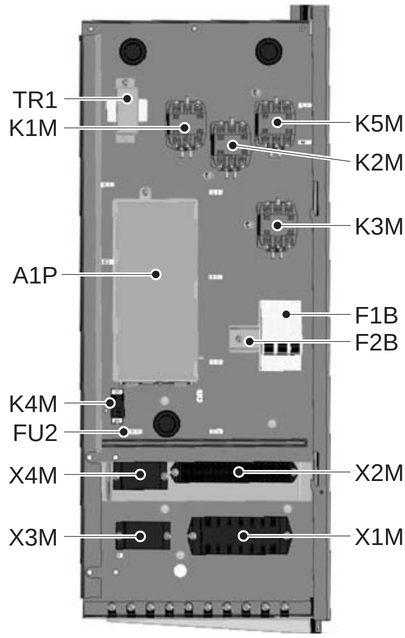


Item	Description
A2P	Printed circuit board (inverter)
A3P	Printed circuit board (noise filter)
L4R	Reactor

5.4 Switch Box Layout for EKHBH(X)016A***

The illustration below shows the switch box layout:



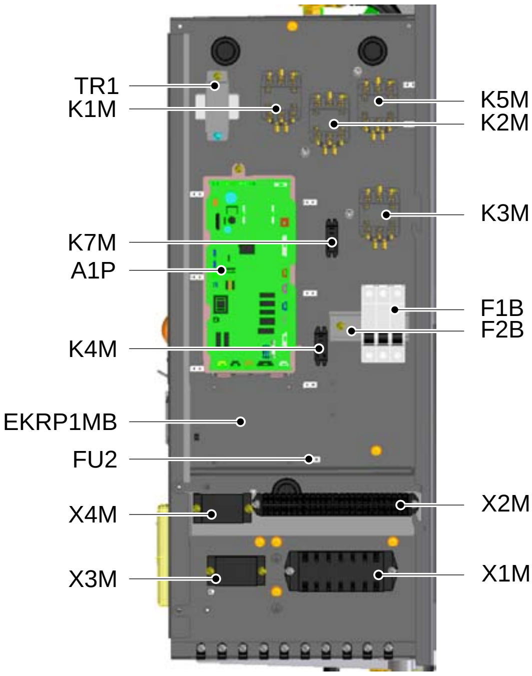


Item	Description
K1M	Contactor backup heater step 1
K2M	Contactor backup heater step 2
K3M	Contactor booster heater
K4M	Pump relay
K5M	Safety contactor backup heater step 1/2
X1M	Terminal strips: power supply backup heater + in/outdoor wiring (123)
X2M	Terminal strips: field wiring
X3M	Terminal strips: booster heater supply to contactor
X4M	Terminal strips: from contactor to booster heater
F1B	Fuse backup heater
F2B	Fuse booster heater
A1P	Printed circuit board (main)
TR1	Transformer (220 V/24 V)
FU2	Fuse pump

1

5.5 Switch Box Layout for EKHBH(X)016AB***

The illustration below shows the switch box layout:



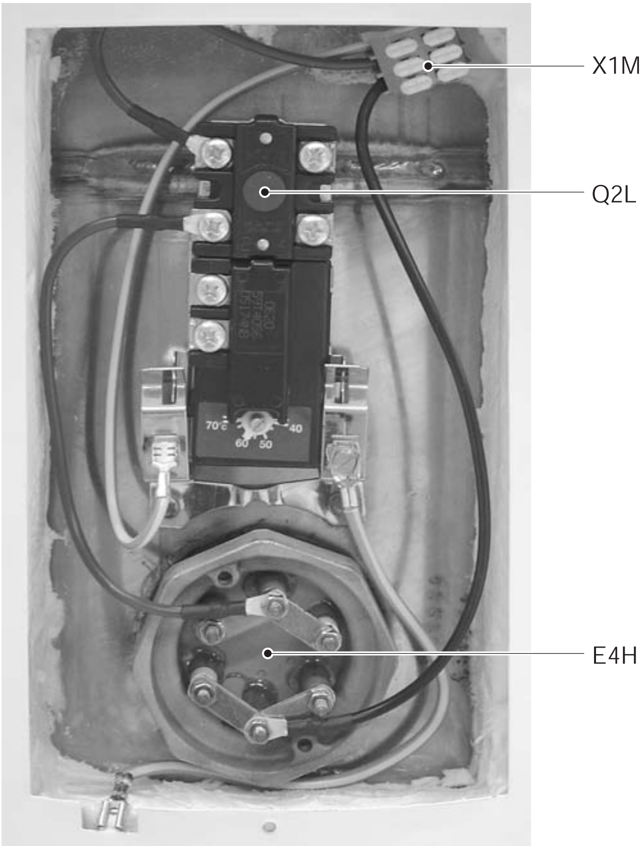
Item	Description
K1M	Contactor backup heater step 1
K2M	Contactor backup heater step 2
K3M	Contactor booster heater
K4M	Pump relay
K5M	Safety contactor backup heater step 1/2
K7M	Relay for EKSOLHWAV1 pump (relay delivered with EKSOLHWAV1)
EKRP1MB	Alarm/operation signal and solar input PCB (PCB delivered with EKSOLHWAV1)
X1M	Terminal strips: power supply backup heater + in/outdoor wiring (123)
X2M	Terminal strips: field wiring
X3M	Terminal strips: booster heater supply to contactor

X4M	Terminal strips: from contactor to booster heater
F1B	Fuse backup heater
F2B	Fuse booster heater
A1P	Printed circuit board (main)
TR1	Transformer (220 V/24 V)
FU2	Fuse pump

1

5.6 Switch Box Layout for EKSWW***V3/Z2

The illustration below shows the switch box layout:

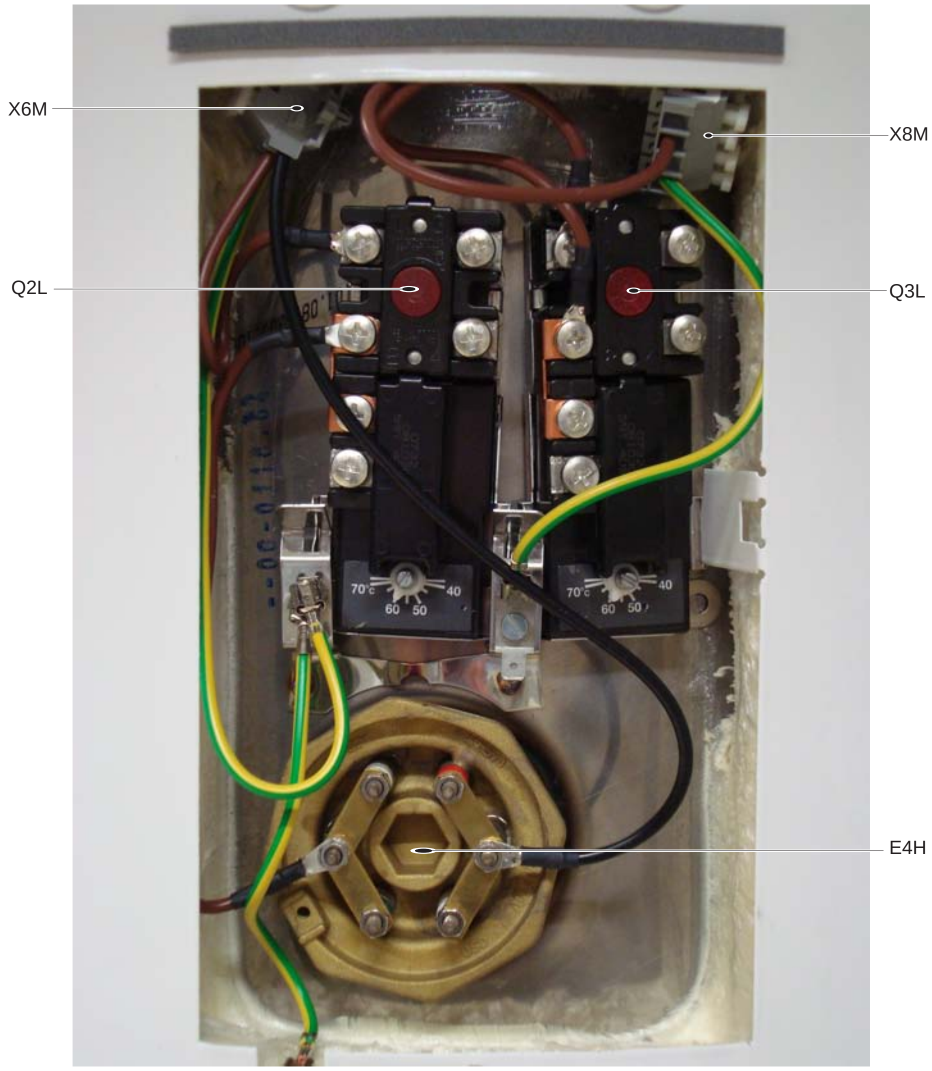


Item	Description
X1M	Terminal strip nr 1-2: power supply booster heater
Q2L	Thermal protector booster heater: connection nr 1-2
E4H	Booster heater 3 kW 230 V (1) / 400 V (Z2)
Q2L	Thermal protector input hydrobox: connection nr. 3-4

(1) Remark: Internal connection of Booster heater 3 kW 400 V is slightly different.

5.7 Switch Box Layout for EKHWS***V3/Z2

The illustration below shows the switch box layout:



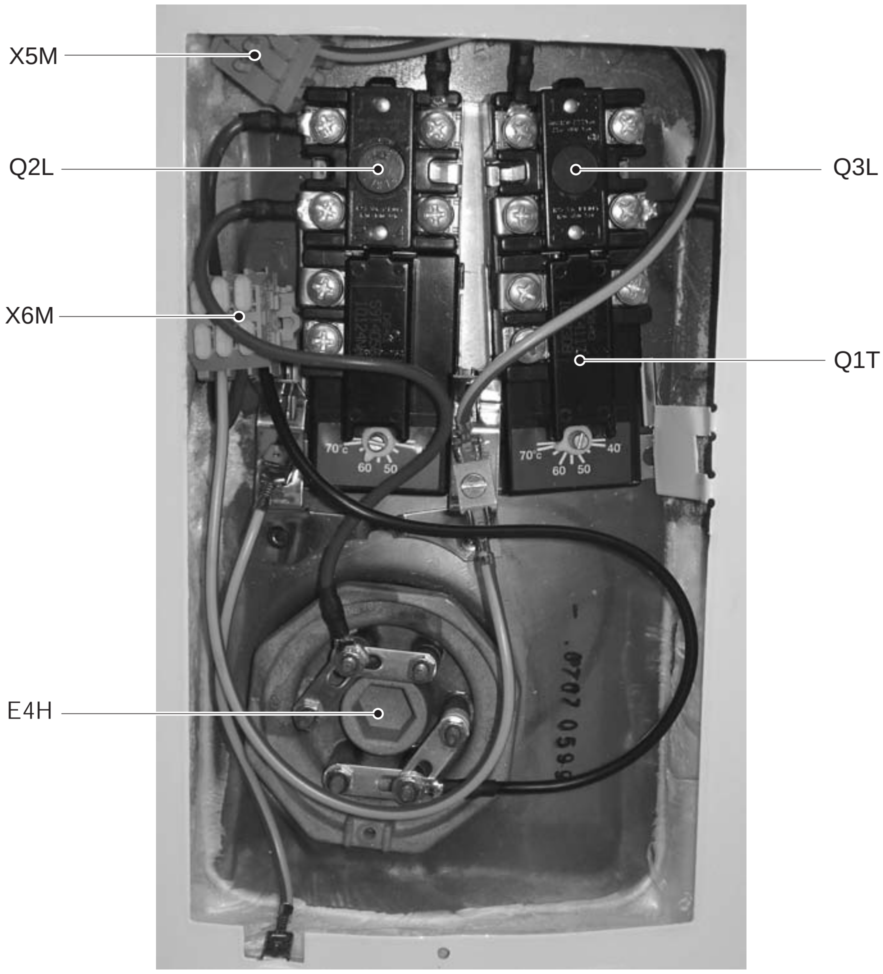
Item	Description
X6M	Terminal strip nr 1-2: power supply booster heater
X8M	Terminal strip nr 1-2: power supply to EKSOLHWAV1 pump Terminal strip nr 3-4: power supply from Hydrobox (X2M: 19-20)
Q2L	Thermal protector booster heater: connection nr 1-2 (V3) / 1-2 3-4 (Z2)
Q3L	Thermal protector DHW tank for EKSOLHWAV1: connection nr 1-2
Q3L (Z2)	Thermal protector input towards Hydrobox: connection nr 3-4
Q2L (V3)	Thermal protector input towards Hydrobox: connection nr 3-4
E4H	Booster heater 3 kW 230 V (1) (V3) 400V (Z2)

(1) Remark: Internal connection of Booster heater 3 kW 400 V is slightly different.

1

5.8 Switch Box Layout for EKSWWU***V3

The illustration below shows the switch box layout:



Item	Description
X5M	Terminal strip nr 1-2: power supply to solenoide valve (Y1S) from hydrobox (X7M: 1-2)
X6M	Terminal strip nr 1-2: power supply booster heater
Q2L	Thermal protector booster heater: connection nr 1-2/3-4
E4H	Booster heater 3 kW 230 V (1)
Q1T	Thermostat DHW water tank
Q3L	Thermal protector DHW water tank connection nr 1-2/3-4

5.9 Switch Box Layout for EKHWSU***V3

The illustration below shows the switch box layout:

TBC

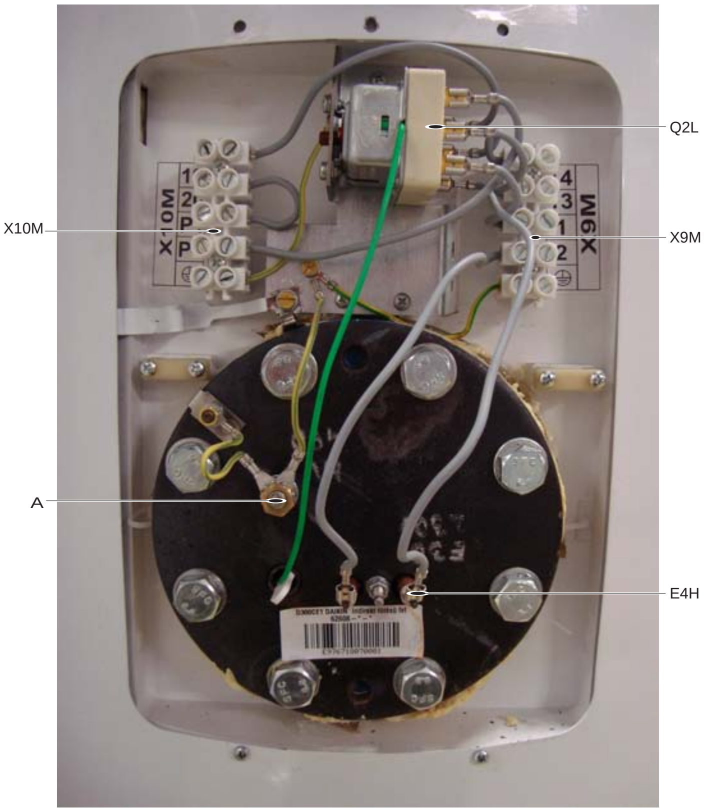
Item	Description
X6M	Terminal strip nr 1-2: power supply booster heater
Q3L	Thermal protector booster heater: connection nr 3-4
Q3L	Thermal protection EKSOLHWAV1 pump: connection nr. 1-2
E4H	Booster heater 3 kW 230 V
Q2T	Thermostat DHW tank for EKUHW2WB: connection nr 1-2
Q2L	Thermal protector DHW tank for EKUHW2WB: connection nr 1-2
Q2L	Thermal protection input hydrobox: connection nr. 3-4
Q3T	Thermostat DHW tank for EKSOLHWAV1: connection nr 1-2
X5M	Terminal strip nr 2-3: power supply EKUHW2WB from Hydrobox (X7M: 1-2)
X8M	Terminal strip nr 1-2: power supply to EKSOLHWAV1 pump Terminal strip nr 3-4: power supply from Hydrobox (X2M: 19-20)

1

5.10 Switch Box Layout for EKHWE***V3/Z2

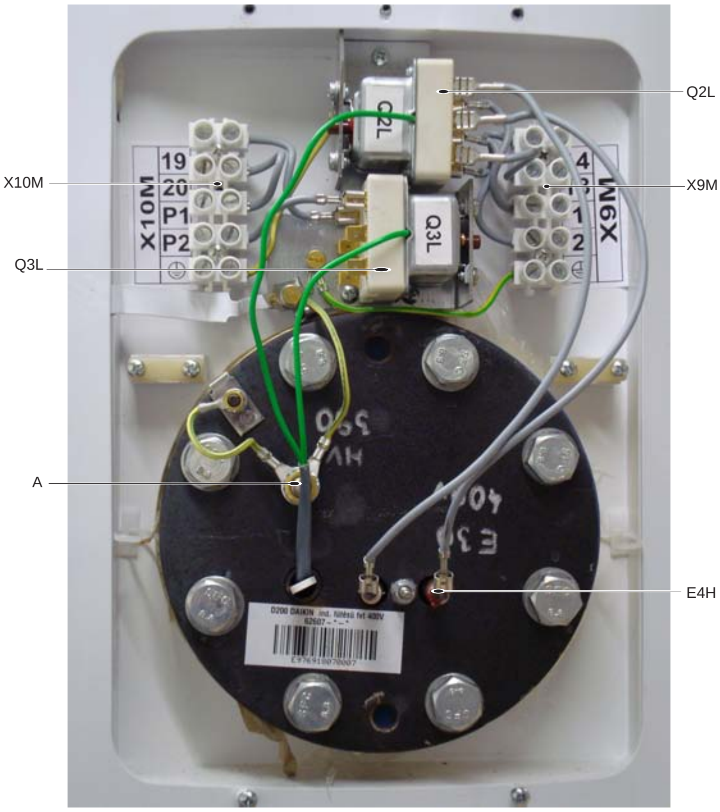
EKHWE*V3**

The illustration below shows the switch box layout:



EKHWE*Z2**

The illustration below shows the switch box layout:



Item	Description
X9M	Terminal strip nr 1-2: power supply booster heater
Q3L	Thermal protector DHW tank for EKSOLHWAV1 pump: connection nr 31-32 (Z2)
E4H	Booster heater 3 kW 230 V (V3) 400 V (Z2)
Q2L	Thermal protector booster heater: connection nr 31-32 (V3) / 11-12. 21-22 (Z2)
Q2L	Thermal protector DHW for EKSOLWAV1 pump: connection nr. 11-12 (V3)
Q2L	Thermal protection input towards hydrobox: connection nr. 21-22 (V3) / 31-32 (Z2)
A	Anode enamel tank
X10M	Terminal strip nr 19-20: power supply from Hydrobox (X2M: 19-20) Terminal strip nr p1-p2: power supply to EKSOLHWAV1 pump

1

6 Wiring Diagrams

6.1 What Is in This Chapter?

Introduction

This chapter contains the wiring diagrams of the outdoor, hydro-box and domestic hot water tank.

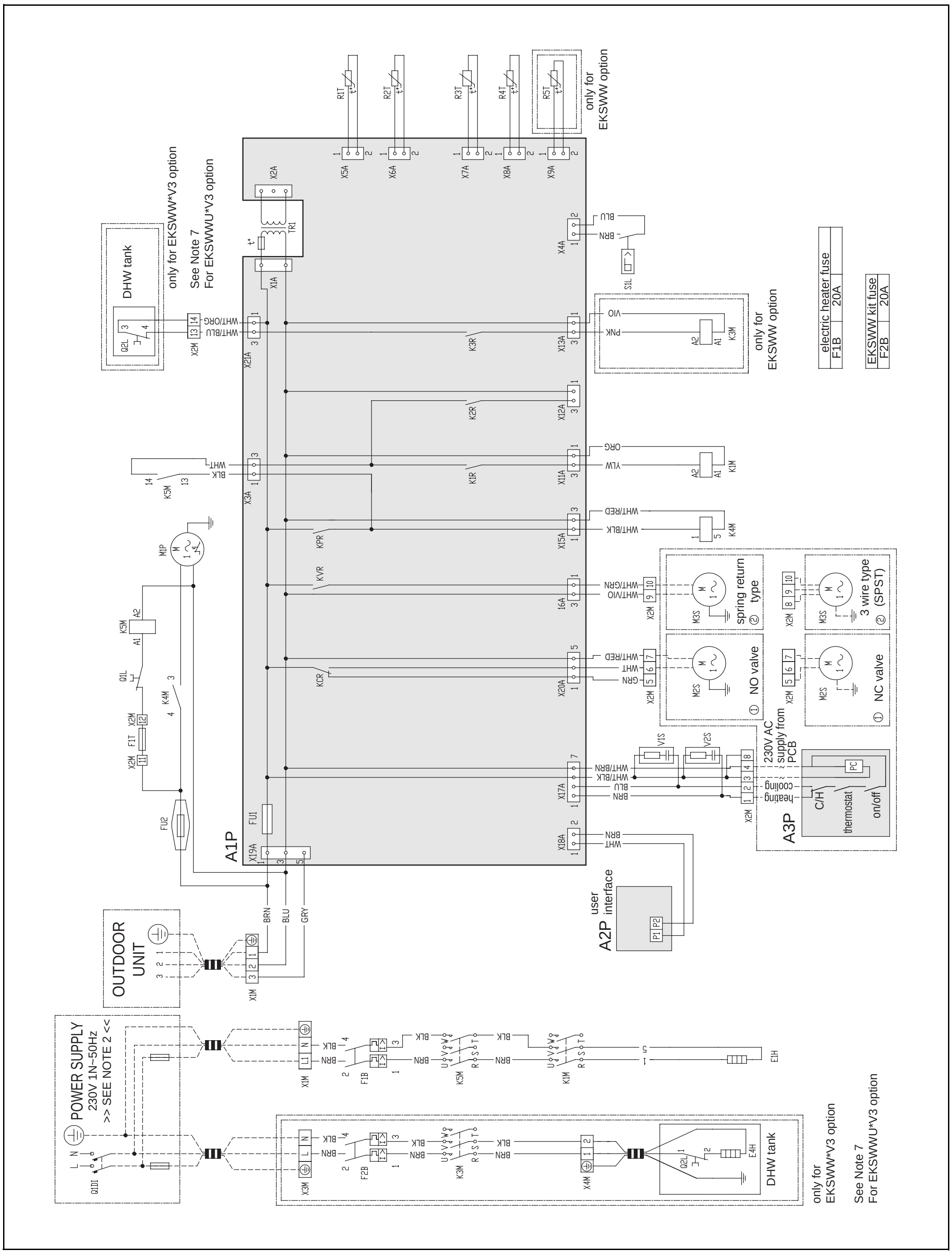
Altherma:

This chapter contains the following wiring diagrams:

6.2 Wiring Diagram for EKHBH(X)016AA3V3

Wiring diagram

The illustration below shows the wiring diagram of the unit.



1

Legend

A1P	Main PCB	M1P	Pump
A2P	User interface PCB	M2S	2-way valve for cooling mode
A3P	Thermostat field supply (PC=power circuit)	M3S	3-way valve: floorheating/domestic hot water
E1H	Backup heater element 1 (3kW)	Q1L	Thermal protector backup heater
E4H	Booster heater (3kW)	Q2L	Thermal protector booster heater
F1B	Fuse backup heater	Q1DI	Earth leakage protector
F2B	Fuse booster heater	R1T (A1P)	Outlet water heat exchanger thermistor
F1T	Thermal fuse backup heater	R2T	Outlet water backup heater thermistor
FU1	Fuse 3.15A T 250 V for PCB	R3T	Refrigerant liquid side thermistor
FU2	Fuse 5A T 250V for pump	R4T	Inlet water thermistor
K1M	Contactor backup heater	R5T	Domestic hot water thermistor
K3M	Contactor booster heater	S1L	Flowswitch
K4M	Pump relay	TR1	Transformer 24 V for PCB
K5M	Contactor for backup heater all pole disconnection	X1M-X4M	Terminal strips
		V1S, V2S	Spark suppression 1, 2

Notes

1 This wiring diagram only applies to the hydro-box

2 Use one and same dedicated power supply for hydro-box, outdoor unit and EKSWW option.

3 Field wiring — **NO/NC** Normal open / Normal closed

SPST Single pole single throw

4 Terminal strip — Connector

Terminal — Protective earth

5 Do not operate the unit by short-circuiting any protection device.

6 BLK = Black, RED = Red; BLU = Blue, WHT = White, PNK = Pink , YLW = Yellow, BRN = Brown, GRY = Grey, GRN = Green, ORG = Orange, VIO = Violet

7 For EKSWWU*V3, refer to option manual

Symbols

Wiring dependent on model — Field wiring

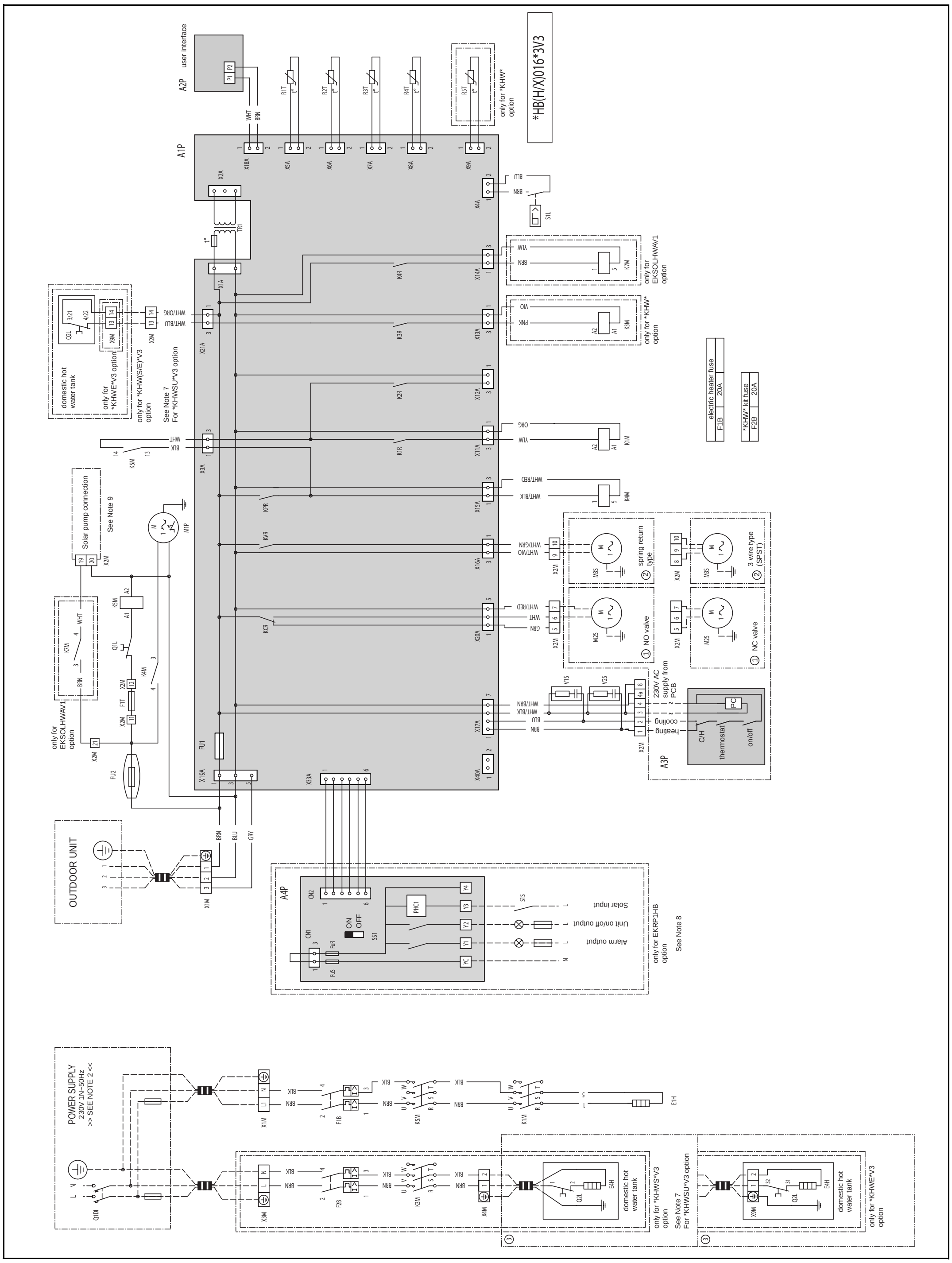
Option — Field wiring

PCB — BRN Wire colour

6.3 Wiring Diagram for EKHBH(X)016AB3V3

Wiring diagram

The illustration below shows the wiring diagram of the unit.



1

Legend

A1P	Main PCB	M2S	2-way valve for cooling mode
A2P	User interface PCB	M3S	3-way valve: floorheating/domestic hot water
A3P	Thermostat (PC=power circuit)	PHC1	Optocoupler input circuit
A4P	Solar/remote alarm PCB	Q1L	Thermal protector backup heater
E1H	Backup heater element 1	Q2L	Thermal protector booster heater
E4H	Booster heater (3kW)	Q1DI	Earth leakage protector
F1B	Fuse backup heater	R1T	Outlet water heat exchanger thermistor
F2B	Fuse booster heater	R2T	Outlet water backup heater thermistor
F1T	Thermal fuse backup heater	R3T	Refrigerant liquid side thermistor
FU1	Fuse 3.15A T 250 V for PCB	R4T	Inlet water thermistor
FU2	Fuse 5A T 250V	R5T	Domestic hot water thermistor
FuS, FuR	Fuse 5A 250V for solar/remote alarm PCB	S1L	Flowswitch
K1M	Contactor backup heater step 1	S1S	Solar pumpstation relay
K3M	Contactor booster heater	SS1	Dip switch
K4M	Pump relay	TR1	Transformer 24 V for PCB
K5M	Contactor for backup heater all pole disconnection	X1M-X9M	Terminal strips
K7M	Relay for solar pump	V1S, V2S	Spark suppression 1, 2
M1P	Pump		

Notes

1 This wiring diagram only applies to the hydro-box

2 Use one and same dedicated power supply for hydro-box, outdoor unit and EKSWW option.

3 Field wiring; NO/NC Normal open / Normal closed; SPST Single pole single throw

4 Terminal strip; Connector; Terminal; Protective earth

5 Do not operate the unit by short-circuiting any protection device.

6 BLK = Black, RED = Red; BLU = Blue, WHT = White, PNK = Pink , YLW = Yellow, BRN = Brown, GRY = Grey, GRN = Green, ORG = Orange, VIO = Violet

7 For EKSWWU*V3, refer to option manual

Symbols

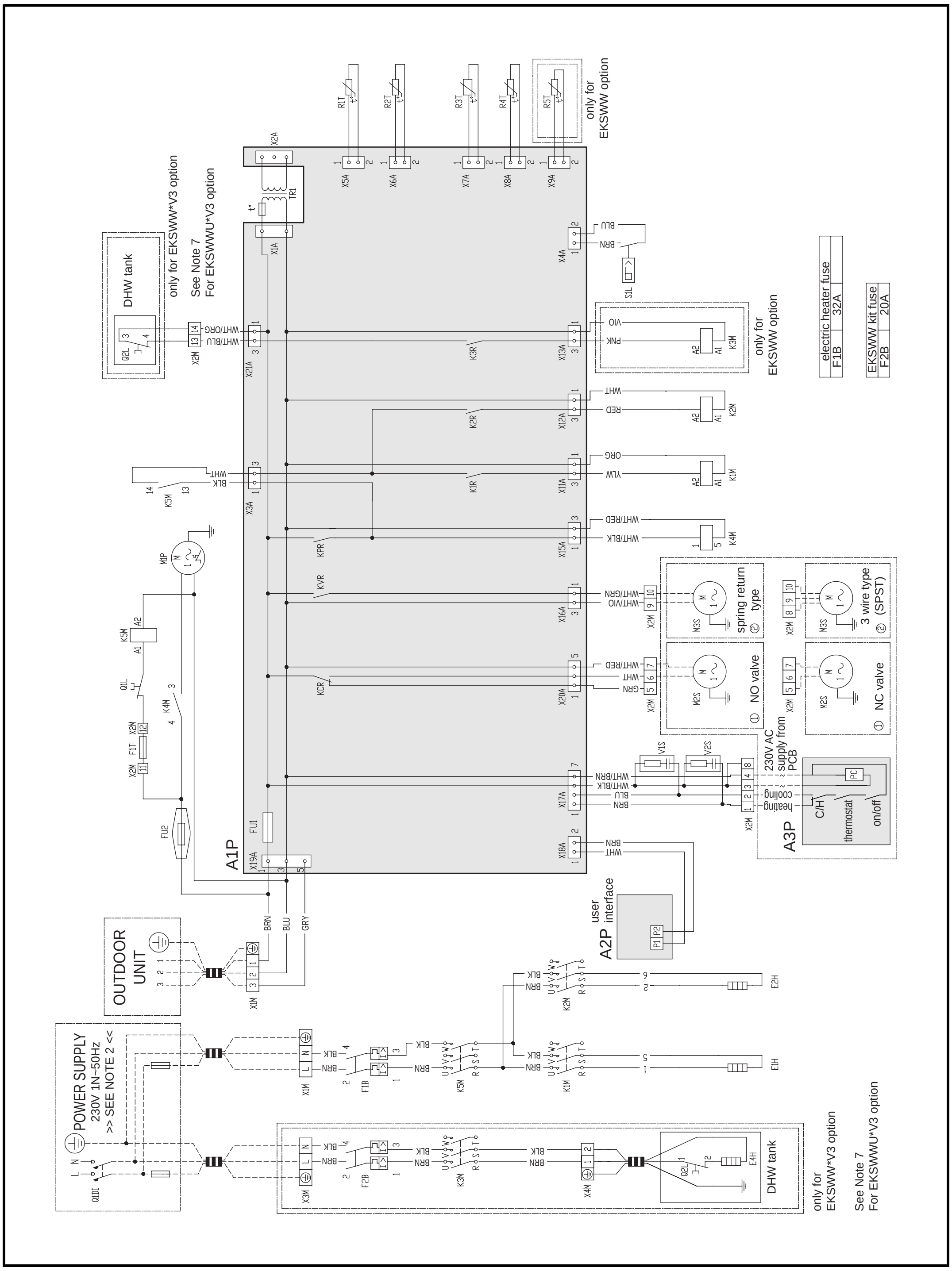
	Wiring dependent on model		Field wiring
	Option		Field wiring
	PCB	BRN	Wire colour

1

6.4 Wiring Diagram for EKHBH(X)016AA6V3

Wiring diagram

The illustration below shows the wiring diagram of the unit.



Legend

A1P	Main PCB	M1P	Pump
A2P	User interface PCB	M2S	2-way valve for cooling mode
A3P	Thermostat field supply (PC=power circuit)	M3S	3-way valve: floorheating/domestic hot water
E1H	Backup heater element 1 (3kW)	Q1L	Thermal protector backup heater
E2H	Backup heater element 2 (3kW)	Q2L	Thermal protector booster heater
E4H	Booster heater (3kW)	Q1DI	Earth leakage protector
F1B	Fuse backup heater	R1T (A1P)	Outlet water heat exchanger thermistor
F2B	Fuse booster heater	R2T	Outlet water backup heater thermistor
F1T	Thermal fuse backup heater	R3T	Refrigerant liquid side thermistor
FU1	Fuse 3.15A T 250 V for PCB	R4T	Inlet water thermistor
FU2	Fuse 5A T 250V for pump	R5T	Domestic hot water thermistor
K1M/K2M	Contactor backup heater step 1/2	S1L	Flowswitch
K3M	Contactor booster heater	TR1	Transformer 24 V for PCB
K4M	Pump relay	X1M-X4M	Terminal strips
K5M	Contactor for backup heater all pole disconnection	V1S, V2S	Spark suppression 1, 2

Notes

1. This wiring diagram only applies to the hydro-box
2. Use one and same dedicated power supply for hydro-box, outdoor unit and EKSWW option.
3. Field wiring; **NO/NC** Normal open / Normal closed; **SPST** Single pole single throw
4. Terminal strip; Connector; Terminal; Protective earth
5. Do not operate the unit by short-circuiting any protection device.
6. BLK = Black, RED = Red; BLU = Blue, WHT = White, PNK = Pink , YLW = Yellow, BRN = Brown, GRY = Grey, GRN = Green, ORG = Orange, VIO = Violet
7. For EKSWWU*V3, refer to option manual

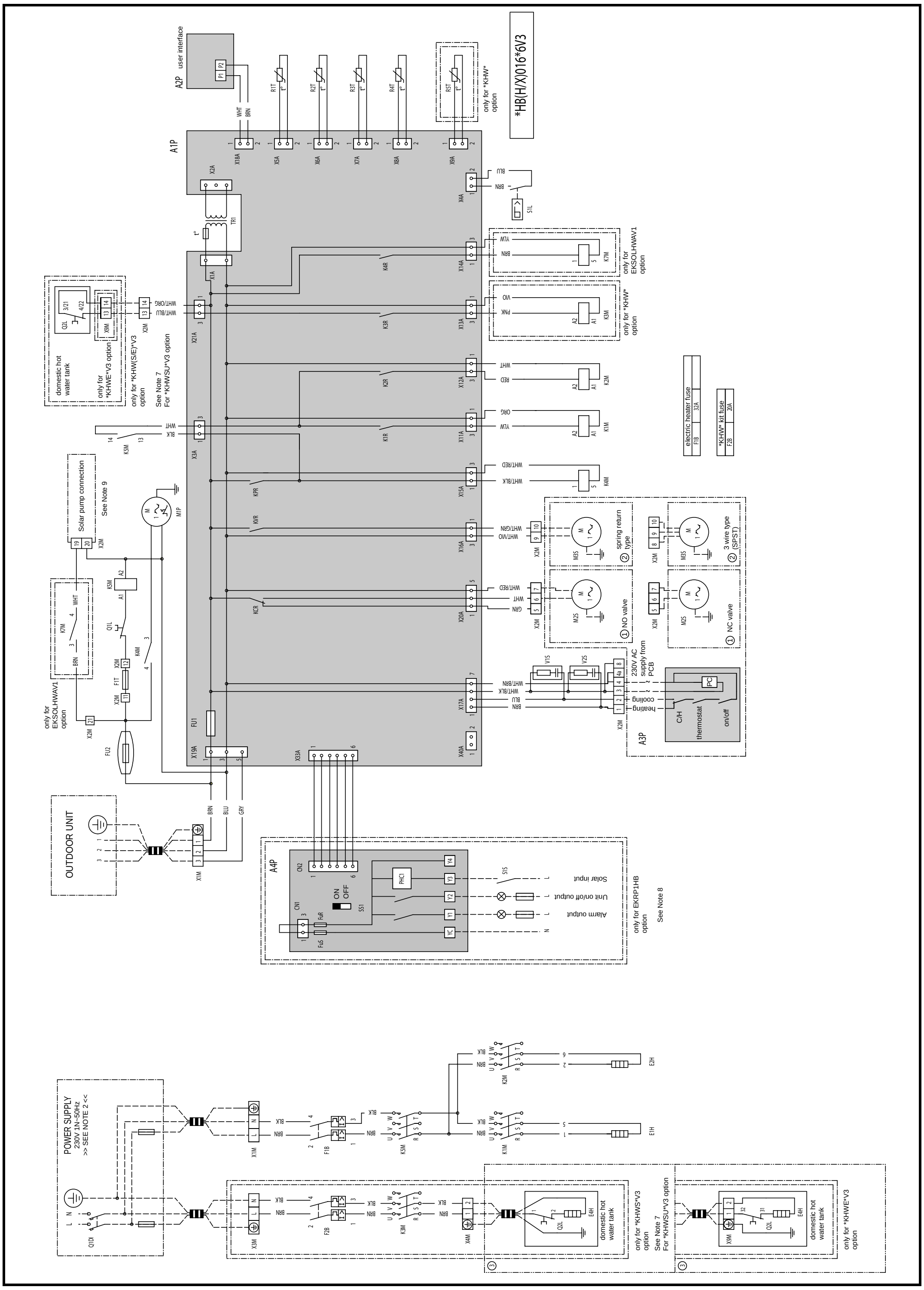
Symbols

Wiring dependent on model	Field wiring
Option	Field wiring
PCB	BRN Wire colour

1

6.5 Wiring Diagram for EKHBH(X)016AB6V3

Wiring diagram The illustration below shows the wiring diagram of the unit.



Legend

A1P	Main PCB	M2S	2-way valve for cooling mode
A2P	User interface PCB	M3S	3-way valve: floorheating/domestic hot water
A3P	Thermostat (PC=power circuit)	PHC1	Optocoupler input circuit
A4P	Solar/remote alarm PCB	Q1L	Thermal protector backup heater
E1H-E2H	Backup heater element 1-2	Q2L	Thermal protector booster heater
E4H	Booster heater (3kW)	Q1DI	Earth leakage protector
F1B	Fuse backup heater	R1T	Outlet water heat exchanger thermistor
F2B	Fuse booster heater	R2T	Outlet water backup heater thermistor
F1T	Thermal fuse backup heater	R3T	Refrigerant liquid side thermistor
FU1	Fuse 3.15A T 250 V for PCB	R4T	Inlet water thermistor
FU2	Fuse 5A T 250V for pump	R5T	Domestic hot water thermistor
FuS, FuR	Fuse 5A 250V for solar/remote alarm PCB	S1L	Flowswitch
K1M/K2M	Contactor backup heater step 1/2	S1S	Solar pumpstation relay
K3M	Contactor booster heater	SS1	Dip switch
K4M	Pump relay	TR1	Transformer 24 V for PCB
K5M	Contactor for backup heater all pole disconnection	X1M-X9M	Terminal strips
K7M	Relay for solar pump	V1S, V2S	Spark suppression 1, 2
M1P	Pump		

Notes

1. This wiring diagram only applies to the hydro-box
2. Use one and same dedicated power supply for hydro-box, outdoor unit and EKSWW option.
3. Field wiring; **NO/NC** Normal open / Normal closed; **SPST** Single pole single throw
4. Terminal strip; Connector; Terminal; Protective earth
5. Do not operate the unit by short-circuiting any protection device.
6. BLK = Black, RED = Red; BLU = Blue, WHT = White, PNK = Pink , YLW = Yellow, BRN = Brown, GRY = Grey, GRN = Green, ORG = Orange, VIO = Violet
7. For EKSWWU*V3, refer to option manual

Symbols

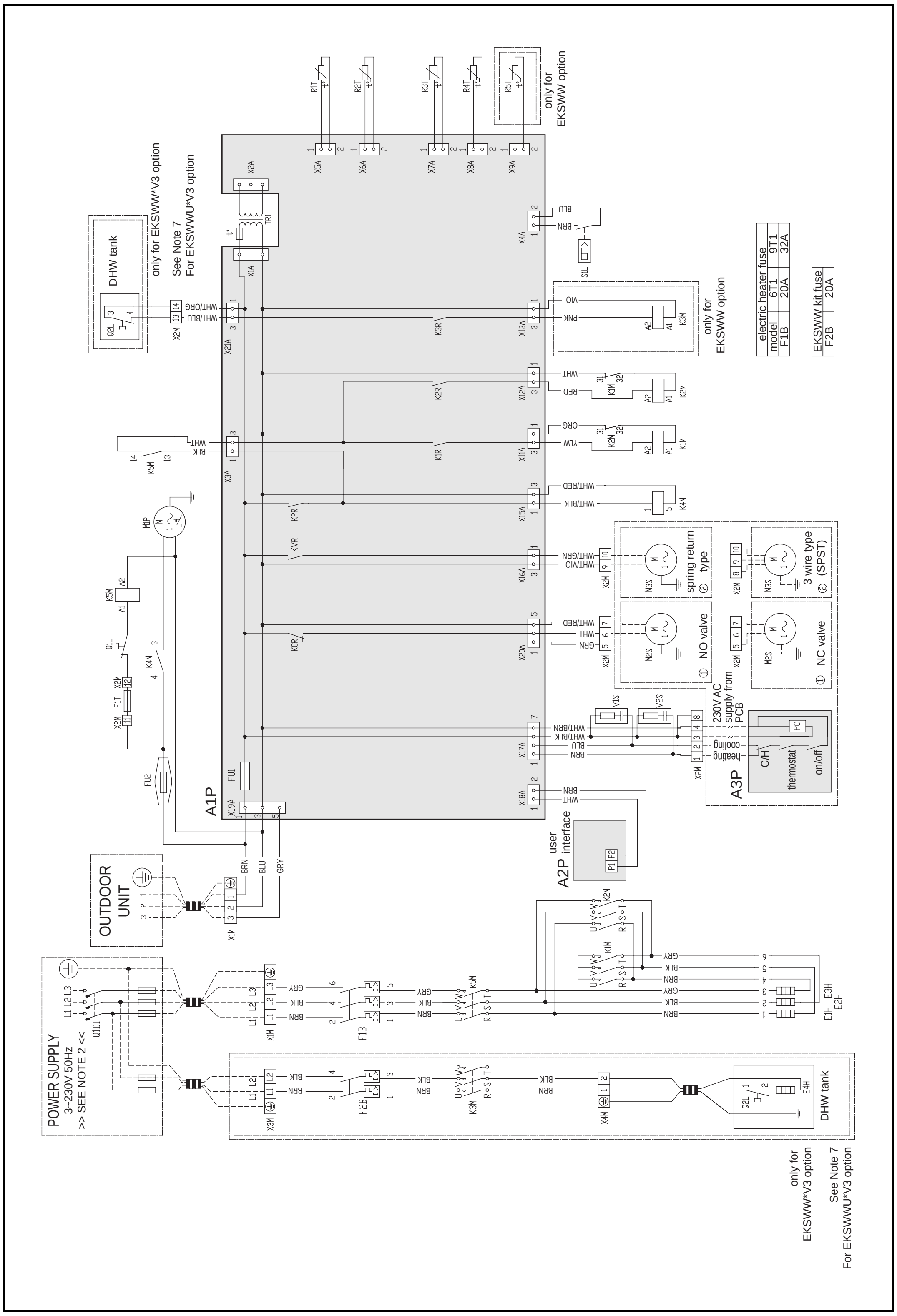
Wiring dependent on model	Field wiring
Option	Field wiring
PCB	BRN Wire colour

1

6.6 Wiring Diagram for EKHBH(X)016AA6T1/9T1

Wiring diagram

The illustration below shows the wiring diagram of the unit.



Legend

A1P	Main PCB	M1P	Pump
A2P	User interface PCB	M2S	2-way valve for cooling mode
A3P	Thermostat field supply (PC=power circuit)	M3S	3-way valve: floorheating/domestic hot water
E1H	Backup heater element 1 (6T1: 2kW / 9T1: 3kW)	Q1L	Thermal protector backup heater
E2H	Backup heater element 2 (6T1: 2kW / 9T1: 3kW)	Q2L	Thermal protector booster heater
E3H	Backup heater element 3 (6T1: 2kW / 9T1: 3kW)	Q1DI	Earth leakage protector
E4H	Booster heater (3kW)	R1T (A1P)	Outlet water heat exchanger thermistor
F1B	Fuse backup heater	R2T	Outlet water backup heater thermistor
F2B	Fuse booster heater	R3T	Refrigerant liquid side thermistor
F1T	Thermal fuse backup heater	R4T	Inlet water thermistor
FU1	Fuse 3.15A T 250 V for PCB	R5T	Domestic hot water thermistor
FU2	Fuse 5A T 250V for pump	S1L	Flowswitch
K1M/K2M	Contactor backup heater step 1/2	TR1	Transformer 24 V for PCB
K3M	Contactor booster heater	X1M-X4M	Terminal strips
K4M	Pump relay	V1S, V2S	Spark suppression 1, 2
K5M	Contactor for backup heater all pole disconnection		

Notes

1 This wiring diagram only applies to the hydro-box

2 Use one and same dedicated power supply for hydro-box, outdoor unit and EKSWW option.

3 Field wiring

NO/ NC Normal open / Normal closed

SPST Single pole single throw

4 Terminal strip

Connector

Terminal

Protective earth

5 Do not operate the unit by short-circuiting any protection device.

6 BLK = Black, RED = Red; BLU = Blue, WHT = White, PNK = Pink , YLW = Yellow, BRN = Brown, GRY = Grey, GRN = Green, ORG = Orange, VIO = Violet

7 For EKSWWU*V3, refer to option manual

Symbols

Wiring dependent on model

Field wiring

Option

Field wiring

PCB

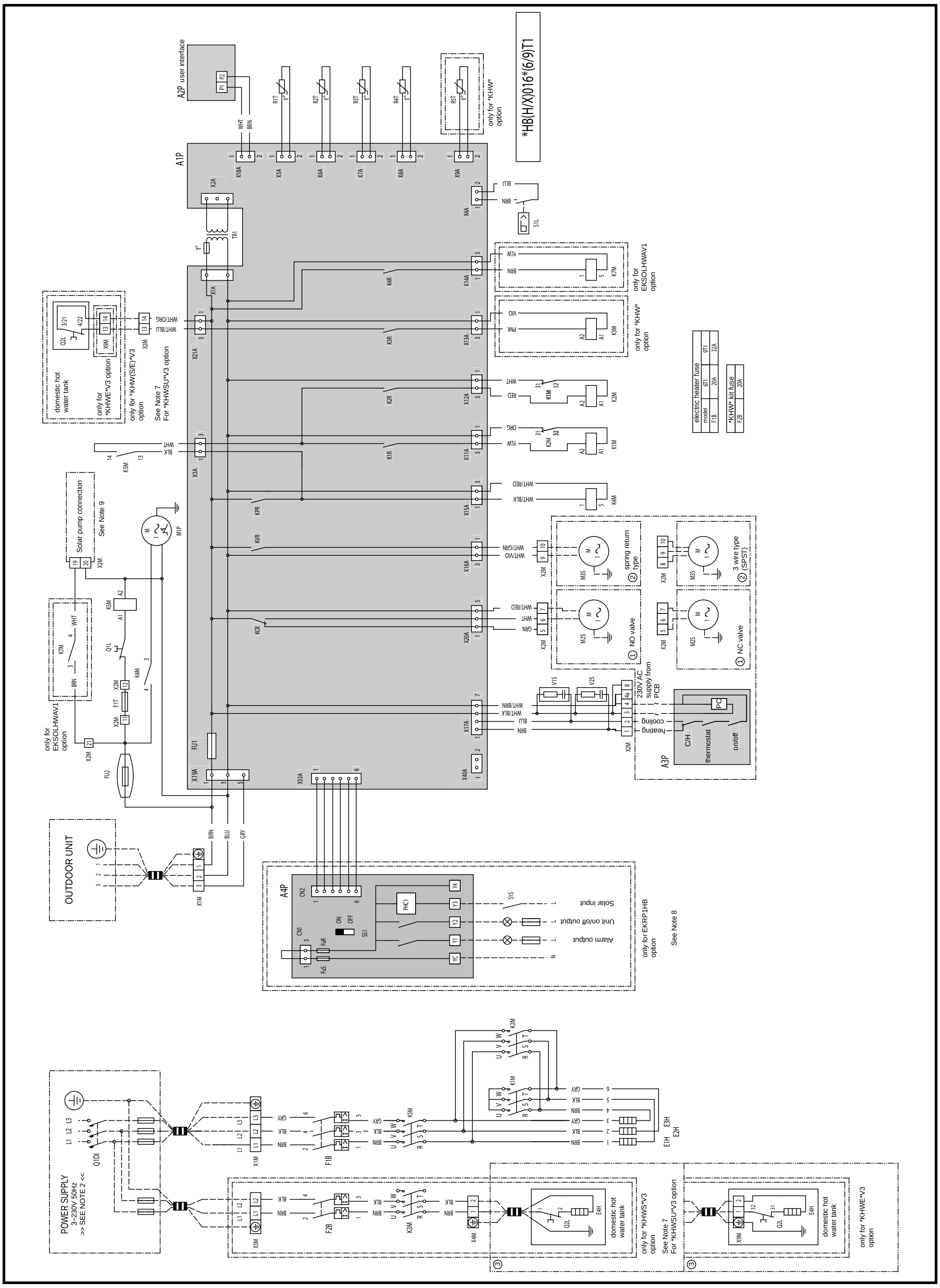
BRN Wire colour

1

6.7 Wiring Diagram for EKHBH(X)016AB6T1/9T1

Wiring diagram

The illustration below shows the wiring diagram of the unit.



1

Legend

A1P	Main PCB	M1P	pump
A2P	User interface PCB	M2S	2-way valve for cooling mode
A3P	Thermostat (PC=power circuit)	M3S	3-way valve: floorheating/domestic hot water
A4P	Solar/remote alarm PCB	PHC1	Optocoupler input circuit
E1H-E3H	Backup heater element 1-3	Q1L	Thermal protector backup heater
E4H	Booster heater (3kW)	Q2L/Q3L	Thermal protector 1/2 booster heater
F1B	Fuse backup heater	Q1DI	Earth leakage protector
F2B	Fuse booster heater	R1T	Outlet water heat exchanger thermistor
F1T	Thermal fuse backup heater	R2T	Outlet water backup heater thermistor
FU1	Fuse 3.15A T 250 V for PCB	R3T	Refrigerant liquid side thermistor
FU2	Fuse 5A T 250V for pump	R4T	Inlet water thermistor
FuS, FuR	Fuse 5A 250V for solar/remote alarm PCB	R5T	Domestic hot water thermistor
K1M/K2M	Contactor backup heater step 1/2	S1L	Flowswitch
K3M	Contactor booster heater	S1S	Solar pumpstation relay
K4M	Pump relay	SS1	Dip switch
K5M	Contactor for backup heater all pole disconnection	X1M-X9M	Terminal strips
K7M	Relay for solar pump	V1S, V2S	Spark suppression 1, 2

Notes

1 This wiring diagram only applies to the hydro-box

2 Use one and same dedicated power supply for hydro-box, outdoor unit and EKSWW option.

3 Field wiring; **NO/ NC** Normal open / Normal closed

SPST Single pole single throw

4 Terminal strip; Connector

Terminal; Protective earth

5 Do not operate the unit by short-circuiting any protection device.

6 BLK = Black, RED = Red; BLU = Blue, WHT = White, PNK = Pink , YLW = Yellow, BRN = Brown, GRY = Grey, GRN = Green, ORG = Orange, VIO = Violet

7 For EKSWWU*V3, refer to option manual

Symbols

Wiring dependent on model — Field wiring

Option — Field wiring

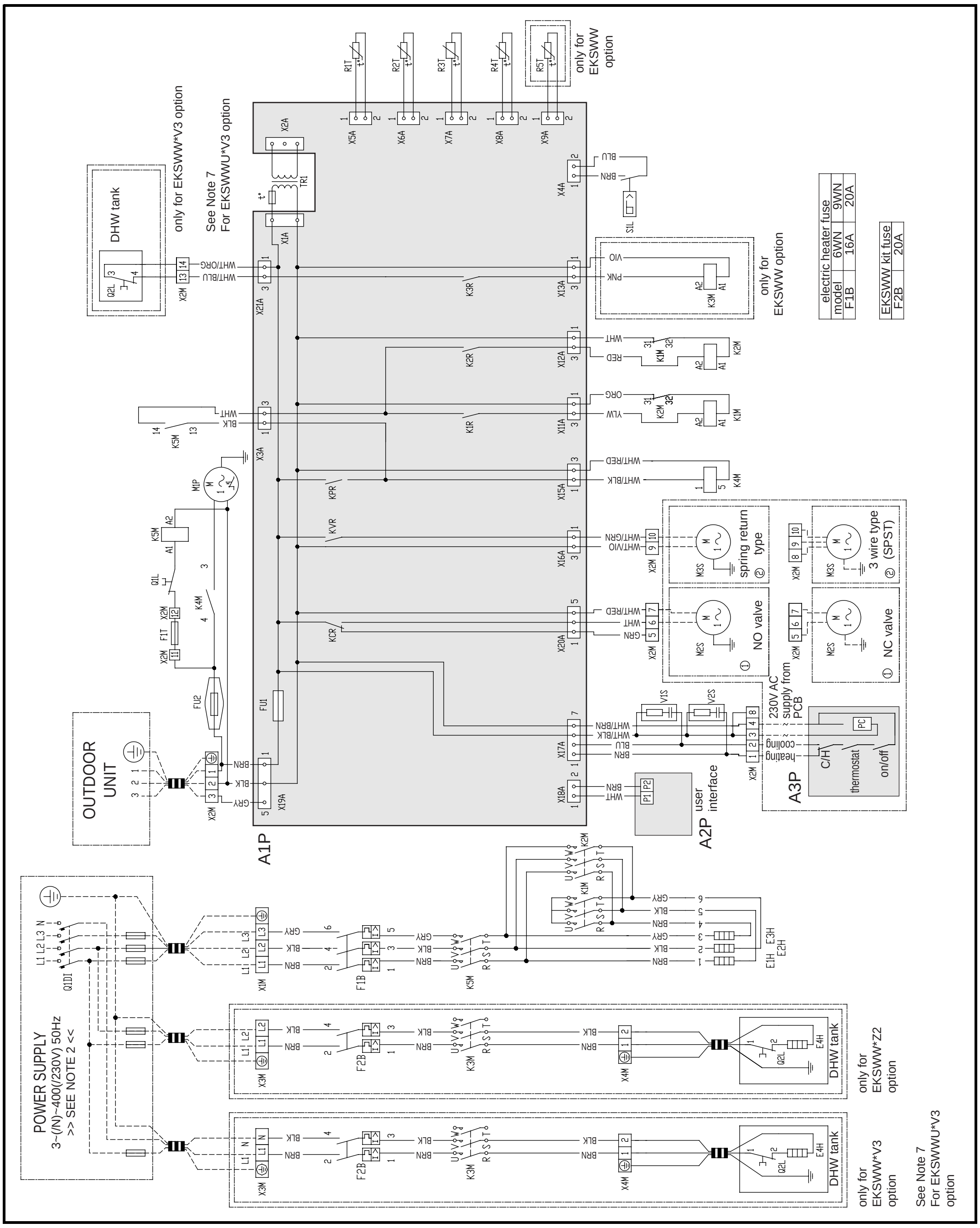
PCB — BRN Wire colour

1

6.8 Wiring Diagram for EKHBH(X)016AA6WN/9WN

Wiring diagram

The illustration below shows the wiring diagram of the unit.



Legend

A1P	Main PCB	K5M	Contactor for backup heater all pole disconnection
A2P	User interface PCB		
A3P	Thermostat field supply (PC=power circuit)	M1P	Pump
E1H	Backup heater element 1 (6WN: 2kW / 9WN: 3kW)	M2S	2-way valve for cooling mode
		M3S	3-way valve: floorheating/domestic hot water
E2H	Backup heater element 2 (6WN: 2kW / 9WN: 3kW)	Q1L	Thermal protector backup heater
		Q2L	Thermal protector booster heater
E3H	Backup heater element 3 (6WN: 2kW / 9WN: 3kW)	Q1DI	Earth leakage protector
		R1T (A1P)	Outlet water heat exchanger thermistor
E4H	Booster heater (3kW)	R2T	Outlet water backup heater thermistor
F1B	Fuse backup heater	R3T	Refrigerant liquid side thermistor
F2B	Fuse booster heater	R4T	Inlet water thermistor
F1T	Thermal fuse backup heater	R5T	Domestic hot water thermistor
FU1	Fuse 3.15A T 250 V for PCB	S1L	Flowswitch
FU2	Fuse 5A T 250V for pump	TR1	Transformer 24 V for PCB
K1M/K2M	Contactor backup heater step 1/2	X1M-X4M	Terminal strips
K3M	Contactor booster heater	V1S, V2S	Spark suppression 1, 2
K4M	Pump relay		

Notes

1. This wiring diagram only applies to the hydro-box
2. Use one and same dedicated power supply for hydro-box, outdoor unit and EKSWW option.
3. Field wiring; **NO/NC** Normal open / Normal closed; **SPST** Single pole single throw
4. Terminal strip; Connector; Terminal; Protective earth
5. Do not operate the unit by short-circuiting any protection device.
6. BLK = Black, RED = Red; BLU = Blue, WHT = White, PNK = Pink , YLW = Yellow, BRN = Brown, GRY = Grey, GRN = Green, ORG = Orange, VIO = Violet
7. For EKSWWU*V3, refer to option manual

Symbols

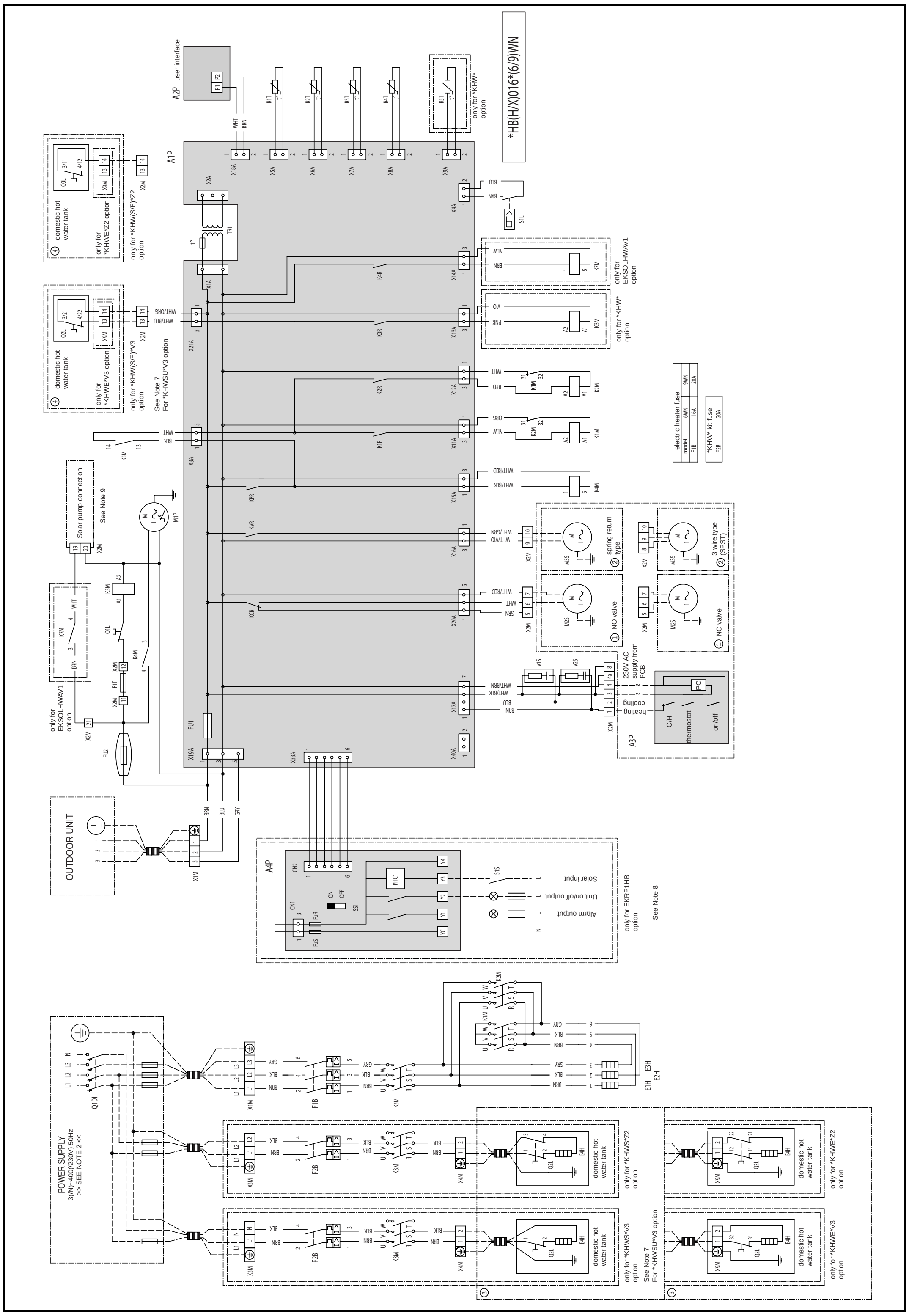
- Wiring dependent on model
- Field wiring
- Option
- Field wiring
- PCB
- BRN Wire colour

1

6.9 Wiring Diagram for EKHBH(X)016AB6WN/9WN

Wiring diagram

The illustration below shows the wiring diagram of the unit.



Legend

A1P	Main PCB	M2S	2-way valve for cooling mode
A2P	User interface PCB	M3S	3-way valve: floorheating/domestic hot water
A3P	Thermostat (PC=power circuit)	PHC1	Optocoupler input circuit
A4P	Solar/remote alarm PCB	Q1L	Thermal protector backup heater
E1H-E3H	Backup heater element 1-3	Q2L/Q3L	Thermal protector 1/2 booster heater
E4H	Booster heater (3kW)	Q1DI	Earth leakage protector
F1B	Fuse backup heater	R1T	Outlet water heat exchanger thermistor
F2B	Fuse booster heater	R2T	Outlet water backup heater thermistor
F1T	Thermal fuse backup heater	R3T	Refrigerant liquid side thermistor
FU1	Fuse 3.15A T 250 V for PCB	R4T	Inlet water thermistor
FU2	Fuse 5A T 250V for pump	R5T	Domestic hot water thermistor
FuS, FuR	Fuse 5A 250V for solar/remote alarm PCB	S1L	Flowswitch
K1M/K2M	Contactor backup heater step 1/2	S1S	Solar pumpstation relay
K3M	Contactor booster heater	SS1	Dip switch
K4M	Pump relay	TR1	Transformer 24 V for PCB
K5M	Contactor for backup heater all pole disconnection	X1M-X9M	Terminal strips
K7M	Relay for solar pump	V1S, V2S	Spark suppression 1, 2
M1P	pump		

Notes

1. This wiring diagram only applies to the hydro-box
2. Use one and same dedicated power supply for hydro-box, outdoor unit and EKSWW option.
3. Field wiring; NO/NC Normal open / Normal closed; SPST Single pole single throw
4. Terminal strip; Connector; Terminal; Protective earth
5. Do not operate the unit by short-circuiting any protection device.
6. BLK = Black, RED = Red; BLU = Blue, WHT = White, PNK = Pink , YLW = Yellow, BRN = Brown, GRY = Grey, GRN = Green, ORG = Orange, VIO = Violet
7. For EKSWWU*V3, refer to option manual

Symbols

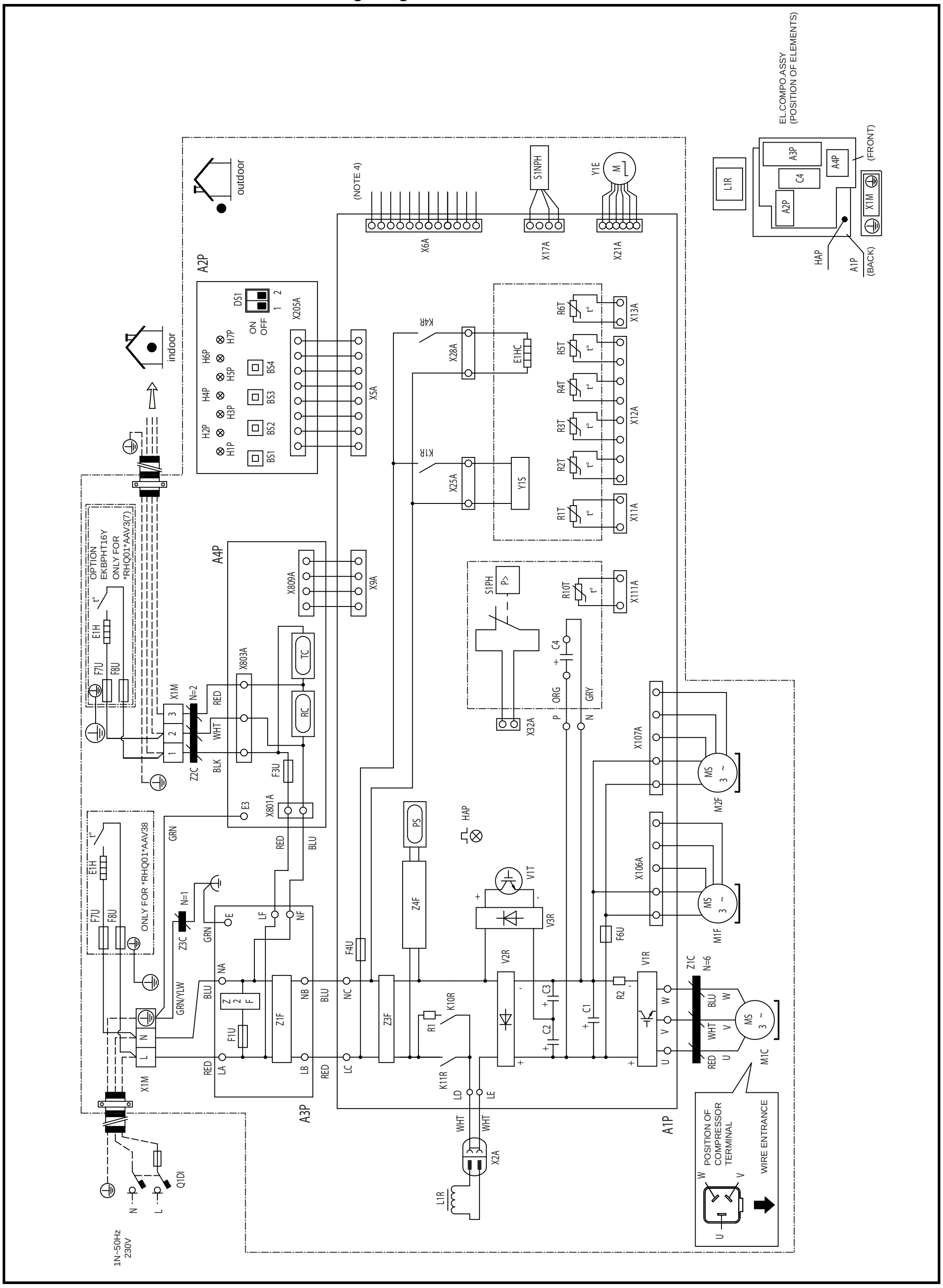
	Wiring dependent on model		Field wiring
	Option		Field wiring
	PCB	BRN	Wire colour

1

6.10 Wiring Diagram for ERHQ011~016AAV3*

Wiring diagram

The illustration below shows the wiring diagram of the unit.



Legend

A1P	Printed circuit board (main)	PS	Switching power supply
A2P	Printed circuit board (inverter)	Q1DI	Field earth leakage breaker (300mA)
A3P	Printed circuit board (noise filter)	R1	Resistor
A4P	Printed circuit board	R2	Resistor
BS1~BS4	Push button switch	R1T	Thermistor (air)
C1~C4	Capacitor	R2T	Thermistor (discharge)
DS1	Dip switch	R3T	Thermistor (suction)
E1H	Bottomplate heater	R4T	Thermistor (heat exchanger)
E1HC	Crankcase heater	R5T	Thermistor (heat exchanger middle)
F1U, F3U, F4U	Fuse (T 6.3A / 250V)	R6T	Thermistor (liquid)
F6U	Fuse (T 5.0A / 250V)	RC	Signal receiver circuit
F7U, F8U	Fuse (F 1.0A / 250V)	R10T	Thermistor (fin)
H1P~7P (A2P)	Light emitting diode (serv. monitor-orange)	S1NPH	Pressure sensor
	[H2P] prepare test - - - - - - - - - - - flickering	S1PH	Pressure switch (high)
	[H2P] malfunction detection - - - - light up	TC	Signal transmission circuit
HAP (A1P)	Light emitting diode (service monitor-green)	V1R	Power module
K1R	Magnetic relay (Y1S)	V2R, V3R	Diode module
K4R	Magnetic relay (E1HC)	V1T	IGBT
K10R	Magnetic relay	X1M	Terminal strip (power supply)
K11R	Magnetic relay	Y1E	Electronic expansion valve
L1R	Reactor	Y1S	Solenoid valve (4 way valve)
M1C	Motor (compressor)	Z1C~Z3C	Noise filter (ferrity core)
M1F	Motor (fan - upper)	Z1F~Z4F	Noise filter
M2F	Motor (fan - lower)		

Notes

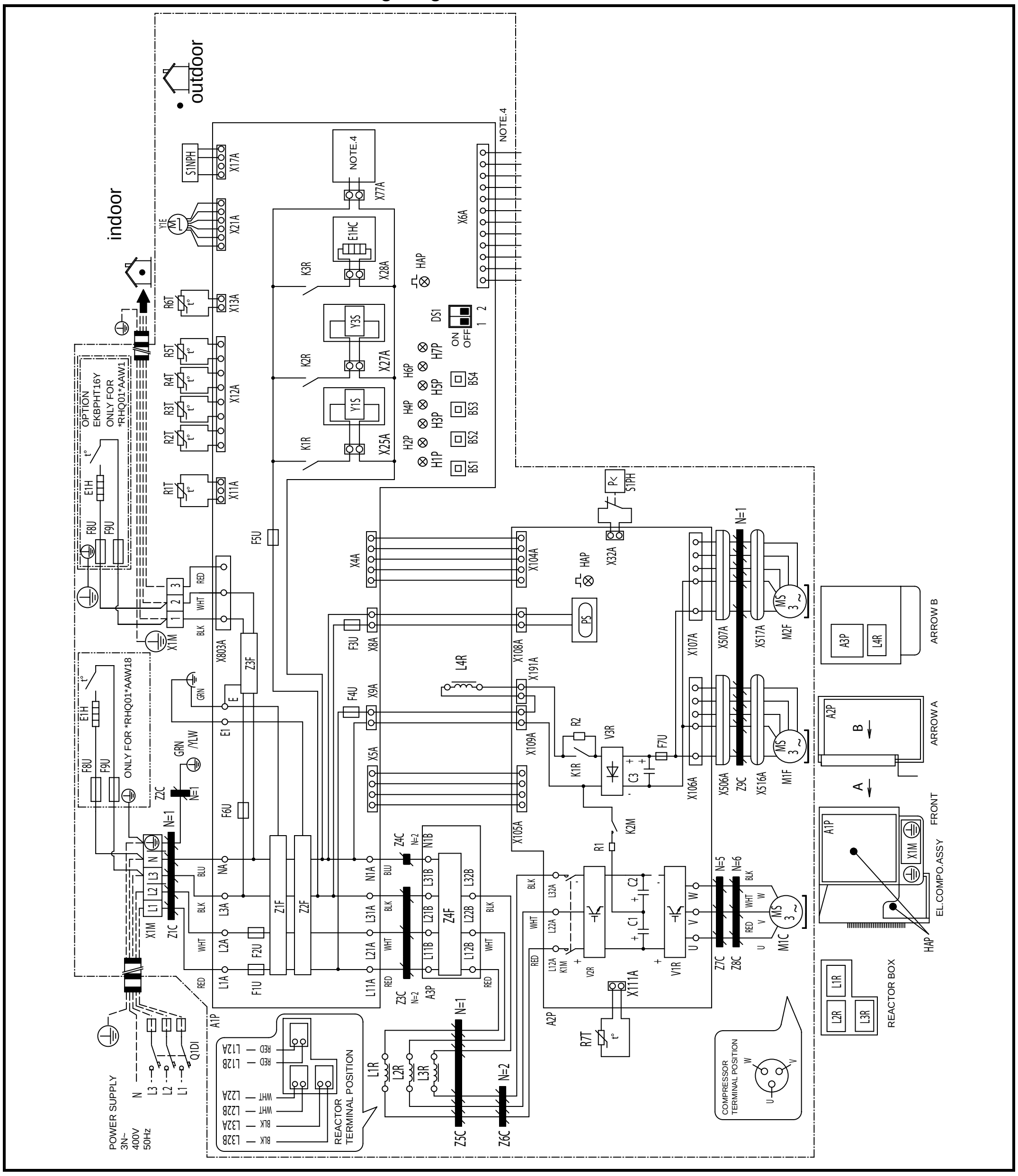
1. This wiring diagram only applies to the outdoor unit.
2. L Live; N Neutral
   Field wiring
3. Terminal strip; Connector
   Terminal; Protective earth (screw)
   Connection; Noiseless earth
   Relay connector
4. Refer to the option manual for connecting wiring to X6A.
5. Refer to the “wiring diagram sticker” (on back of front plate) on how to use BS1~BS4 and DS1 switch.
6. Do not operate the unit by short-circuiting protection device S1PH.
7. Colours: BLU = Blue, BRN = Brown, GRN = Green, RED = Red, WHT = White, YLW = Yellow, ORG = Orange, BLK = Black
8. Confirm the method of setting the selector switches (DS1) by service manual. Factory setting of all switches: ‘OFF’.
9. Option; Wiring dependent on model

1

6.11 Wiring Diagram for ERHQ011~016AAW1*

Wiring diagram

The illustration below shows the wiring diagram of the unit.



Legend

A1P	Printed circuit board	M2F	Motor (fan - lower)
A2P	Printed circuit board (inverter)	PS	Switching power supply
A3P	Printed circuit board (noise filter)	R1~R4	Resistor
BS1~BS4	Push button switch	R1T	Thermistor (air)
C1~C4	Capacitor	R2T	Thermistor (discharge)
DS1	Dip switch	R3T	Thermistor (suction)
E1HC	Crankcase heater	R4T	Thermistor (heat exchanger)
E1H	Bottomplate heater	R5T	Thermistor (heat exchanger middle)
F1U, F2U	Fuse (31.5A, 250V)	R6T	Thermistor (liquid)
F3U~F6U	Fuse (T 6.3A / 250V)	R7T	Thermistor (fin)
F7U	Fuse (T 5.0A / 250V)	S1NPH	Pressure sensor
F8U, F9U	Fuse (T 1.0A / 250V)	S1PH	Pressure switch (high)
HAP (A1P)	Pilot lamp (service monitor-green)	V1R, V2R	Power module
HAP (A2P)	Pilot lamp (service monitor-green)	V3R	Diode module
H1P~7P (A1P)	Pilot lamp (service monitor-orange)	X1M	Terminal strip (power supply)
K1M - K2M	Magnetic contactor	Y1E	Electronic expansion valve
K1R (A1P)	Magnetic relay (Y1S)	Y1S	Solenoid valve (4 way valve)
K1R (A2P)	Magnetic relay	Y3S	Solenoid valve
K2R (A1P)	Magnetic relay (Y2S)	Z1C~Z9C	Noise filter
K3R (A1P)	Magnetic relay (E1HC)	Z1F~Z4F	Noise filter
L1R~L3R	Reactor	Q1DI	Earth Leakage protector
L4R	Reactor (for outdoor fan motor)	Optional connector	
M1C	Motor (compressor)	X6A	connector
M1F	Motor (fan - upper)	X77A	connector

Notes

1 This wiring diagram only applies to the outdoor unit.

2 L Live — N Neutral

Field wiring

3 Terminal strip — Connector

Terminal — Protective earth (screw)

Connection — Noiseless earth

Relay connector

4 Refer to the option manual for connecting wiring to X6A and X77A.

5 Refer to the “wiring diagram sticker” (on back of front plate) on how to use BS1~BS4 and DS1 switch.

6 Do not operate the unit by short-circuiting protection device S1PH.

7 Colours: BLU = Blue, BRN = Brown, GRN = Green, RED = Red, WHT = White, YLW = Yellow, ORG = Orange, BLK = Black

8 Confirm the method of setting the selector switches (DS1) by service manual. Factory setting of all switches: ‘OFF’.

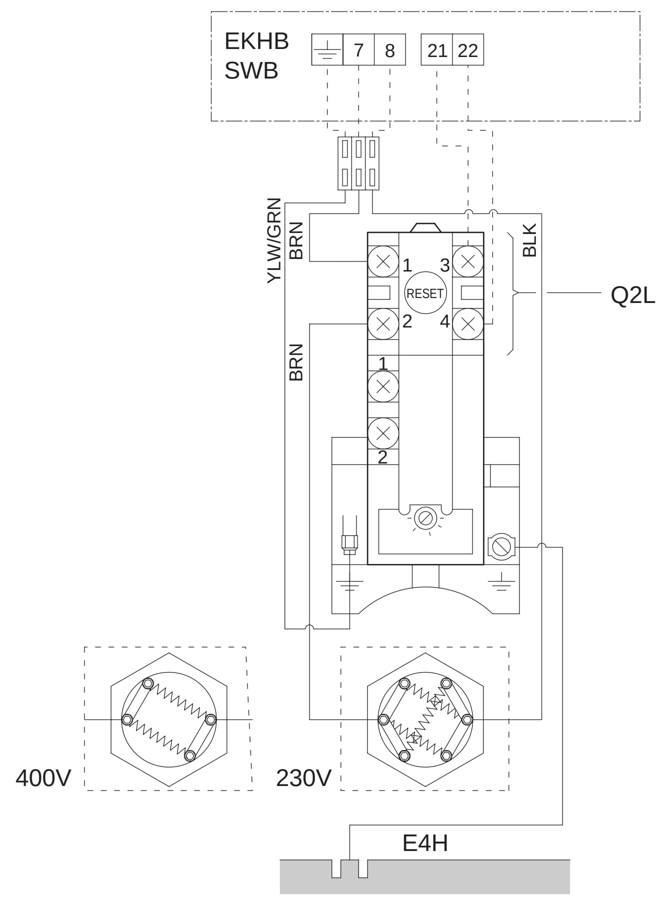
9 Option — Wiring dependent on model

1

6.12 Wiring Diagram for EKSWW150~300V3/Z2

Wiring diagram

The illustration below shows the wiring diagram of the domestic hot water tank.



Legend

E4H	Booster heater
Q2L	Thermostat protector booster heater

Notes

1 This wiring diagram applies to the EKSWW option.

2 Field wiring — Protective earth (screw)

Terminal strip

3 BLK = Black, YLW = Yellow, BRN = Brown, GRN = Green

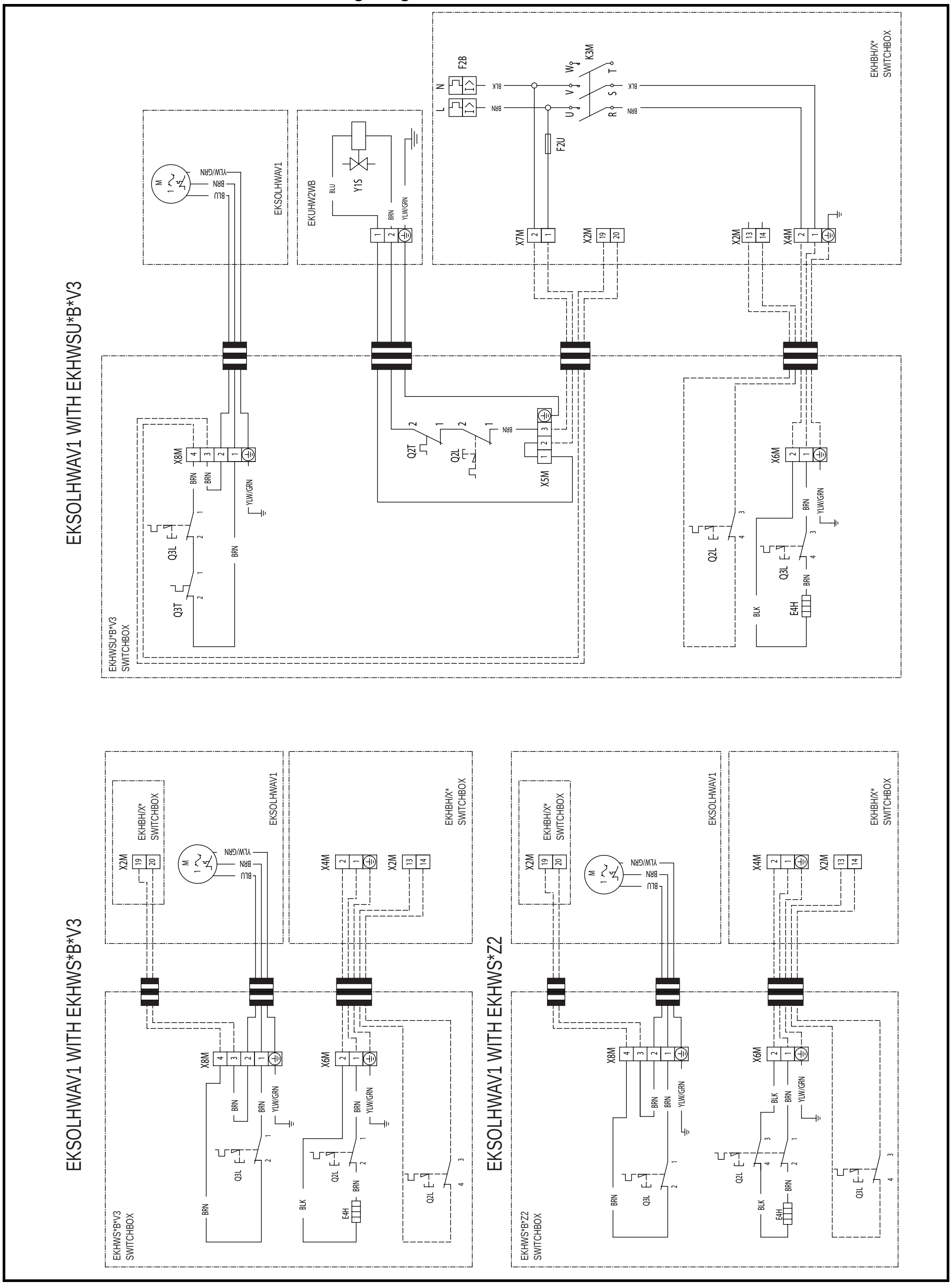
4 Please refer to the EKSWW**0V3/Z2 option manual for more installation details.

1

6.13 Wiring Diagram for EKHWS150~300*V3/Z2 & EKHWSU150~300*V3

Wiring diagram

The illustration below shows the wiring diagram of the domestic hot water tank.



Legend

E4H	Booster heater
F2B	Fuse booster heater
F2U	Fuse 5A / 250V
K3M	Contactor booster heater
L	Line
N	Neutral
Q2L	Thermal protector 1 domestic hot water tank
Q2T	Thermostat protector 1 domestic hot water tank
Q3L	Thermal protector 2 domestic hot water tank
Q3T	Thermostat protector 2 domestic hot water tank
X2M~X4M	Terminal strip
X5M~X8M	Terminal block
Y1S	Solenoid valve

Notes

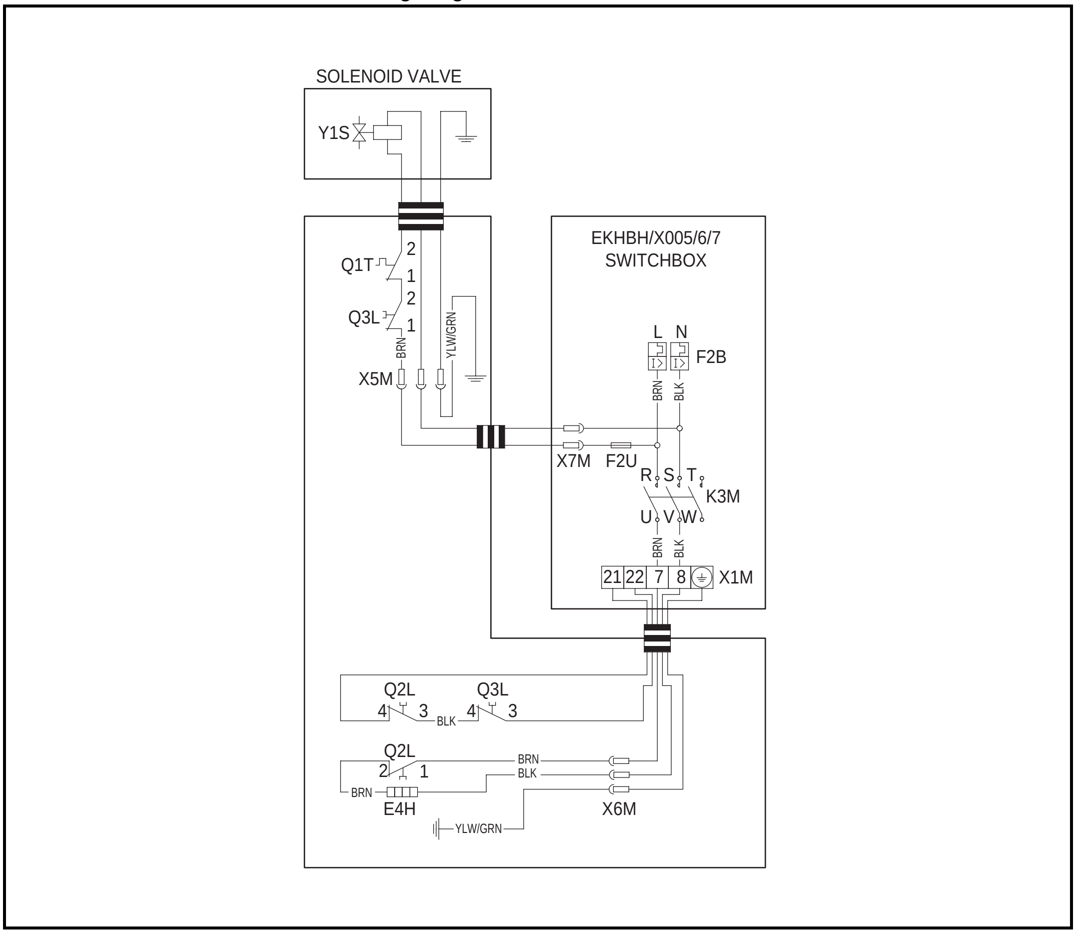
1. Field wiring — Protective earth
   Terminal strip — -------- Field wiring
   —BRN— Wire colour
2. BLK = Black, YLW = Yellow, BRN = Brown, GRN = Green, RED = Red, BLU = Blue, WHT = White, PNK = Pink, VIO = Violet, GRY = Grey, ORG = Orange
3. For more installation details, please refer to the relevant installation manual.

1

6.14 Wiring Diagram for EKSWWU150~300V3

Wiring diagram

The illustration below shows the wiring diagram of the domestic hot water tank.



Legend

E4H	Booster heater
F2B	Fuse booster heater
F2U	Fude 5A/250V
K3M	Contactor booster heater
L	Line
N	Neutral
Q1T	Thermostat domestic hot water tank
Q2L	Thermostat protector booster heater
Q3L	Thermostat protector domestic hot water tank
X1M	Terminal block
X5M~X7M	Terminal block
Y1S	Solenoid valve

Notes

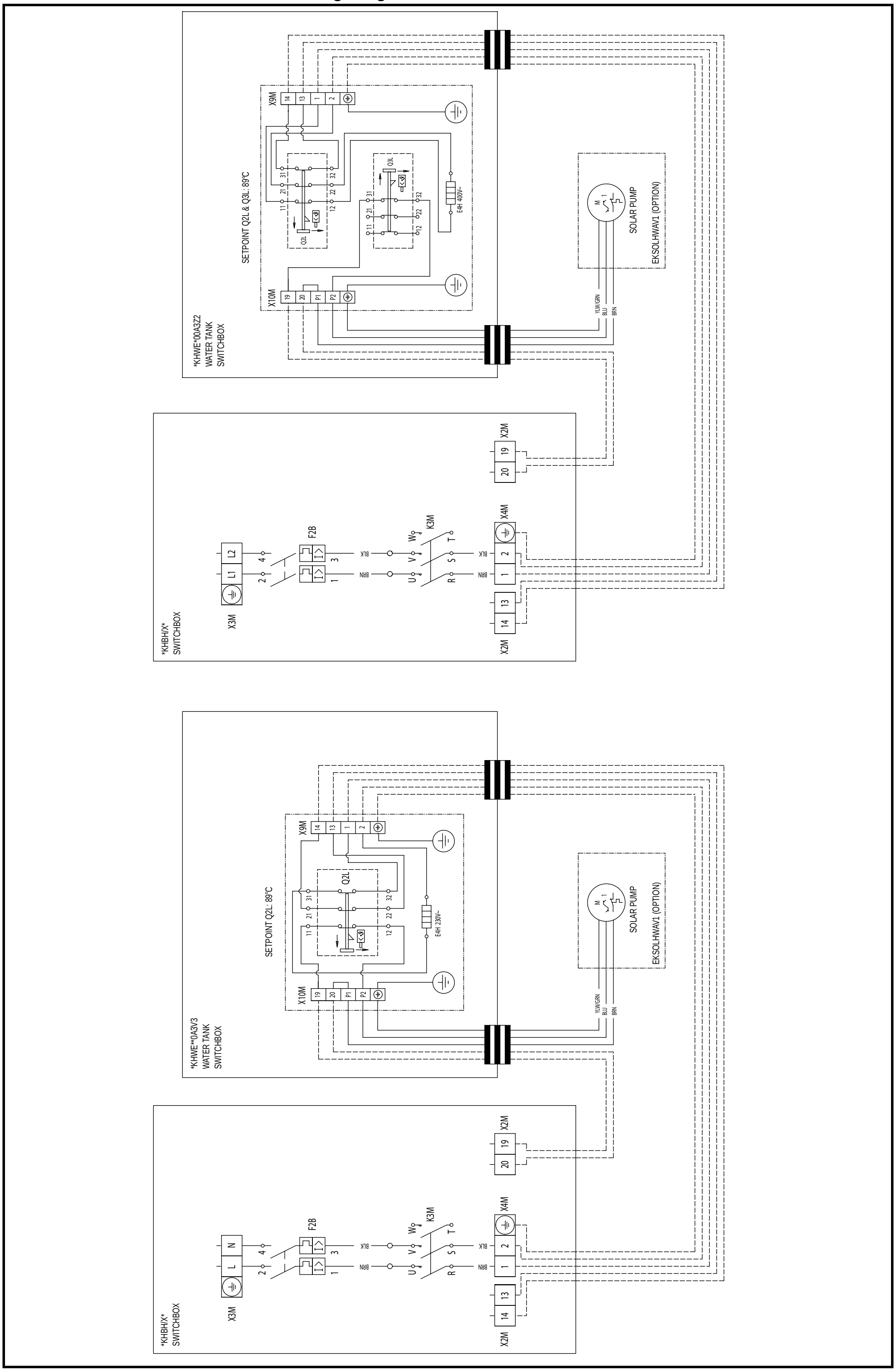
1. This wiring diagram applies to the EKSWWU option.
2. Field wiring — Protective earth (screw)
   Terminal strip
3. BLK = Black, RED = Red, BLU = Blue, WHT = White, PNK = Pink, YLW = Yellow, BRN = Brown, GRY = Grey, GRN = Green, ORG = Orange, VIO = Violet
4. Please refer to the EKSWWU**0V3 option manual for more installation details.

1

6.15 Wiring Diagram for EKHWE150~300*V3/Z2

Wiring diagram

The illustration below shows the wiring diagram of the domestic hot water tank.



Legend

E4H	Booster heater
F2B	Fuse booster heater
K3M	Contactor booster heater
L	Line
N	Neutral
Q2L	Thermal protector Booster heater
Q3L	Thermal protector Hotwater tank
X2M~X4M	Terminal block
X9M~X10M	Terminal block

Notes

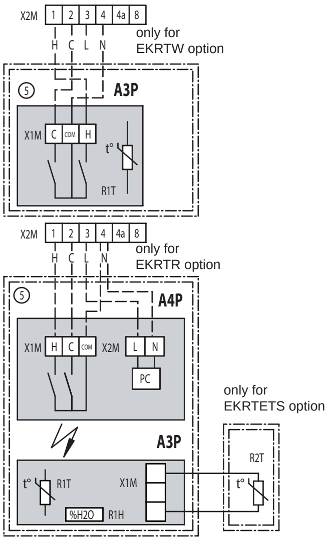
1. Field wiring — Protective earth
   Terminal strip — -------- Field wiring
   —BRN— Wire colour
2. BLK = Black, RED = Red, BLU = Blue, WHT = White, PNK = Pink, YLW = Yellow, BRN = Brown, GRY = Grey, GRN = Green, ORG = Orange, VIO = Violet
3. Please refer to the *KHWE* manual for more installation details.

1

6.16 Wiring Diagram for EKRTR / EKRTW

Wiring diagram

The illustration below shows the wiring diagram of the EKRTR / EKRTW.



1

Legend

A3P	Thermostat (PC= power circuit)
A4P	Receiver PCB
R1H	Humidity sensor
R1T	Ambient sensor
R2T	External sensor (floor or ambient)
X1M-X2M	Terminal strips

Notes

1 This wiring diagram only applies to the indoor unit.

2 Use one and same dedicated power supply for indoor unit, outdoor unit and *KHW* option.

3 Field wiring; NO/NC Normal open / Normal closed; SPST Single pole single throw

4 Terminal strip; Connector; Terminal; Protective earth

5 Do not operate the unit by short-circuiting any protection device.

6 BLK = Black, RED = Red, BLU = Blue, WHT = White, PNK = Pink, YLW = Yellow, BRN = Brown, GRY = Grey, GRN = Green, ORG = Orange, VIO = Violet

7 For *KHWSU*V3, refer to option manual.

8 Option PCB works with an external 230V AC power supply (L, N).

9 For EKSOLHWAV1, refer to option manual.

Symbols

Wiring dependent on model

Field wiring

Option

Field wiring

PCB

BRN

Wire colour

7 PCB Layout

7.1 What Is in This Chapter?

Introduction

This chapter contains the following information:

- It describes which unit uses which PCB types
- It shows the PCB connectors.

Outdoor units

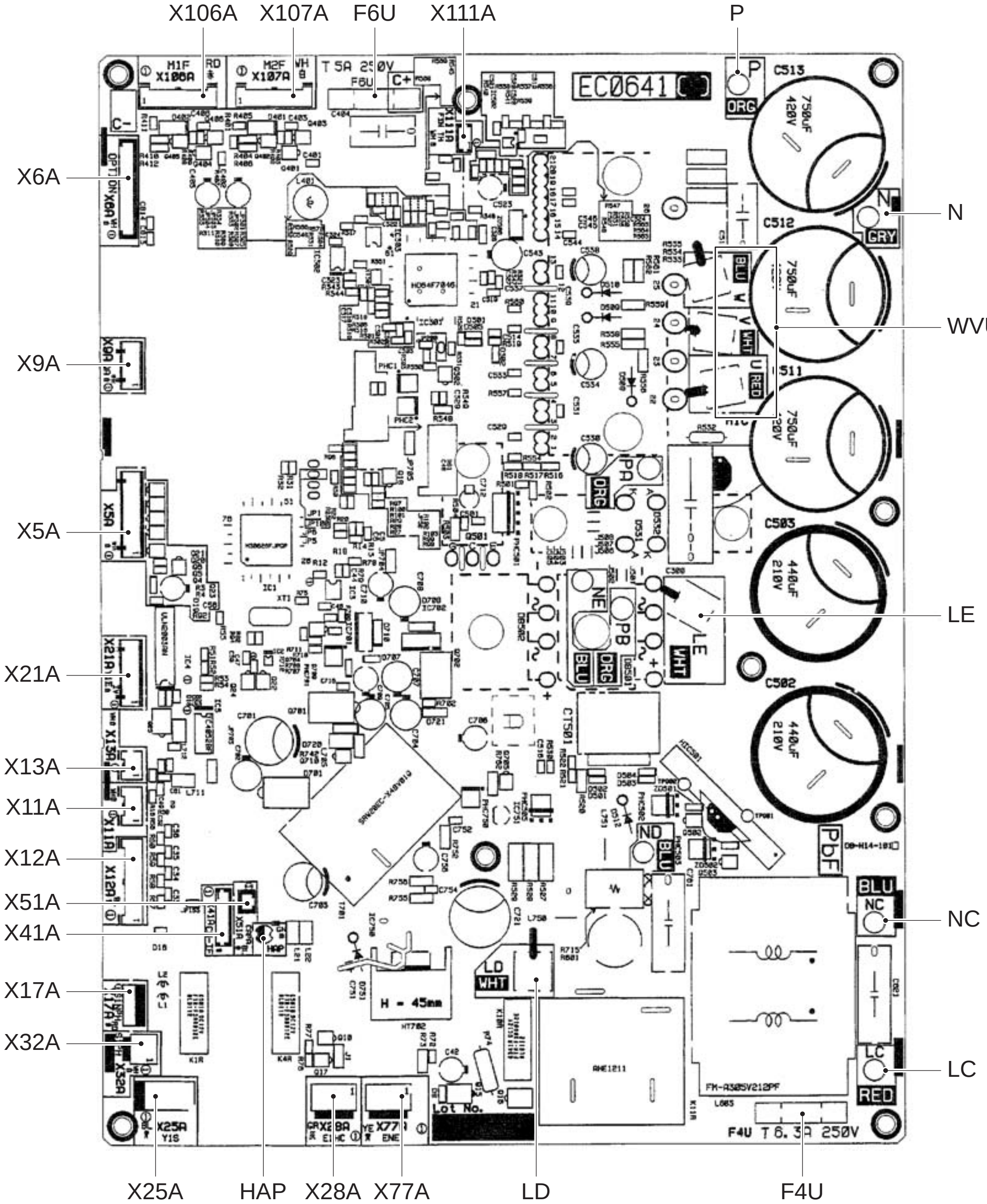
This chapter contains the following PCB layouts:

1

7.2 PCB Layout for ERHQ011~016AAV3

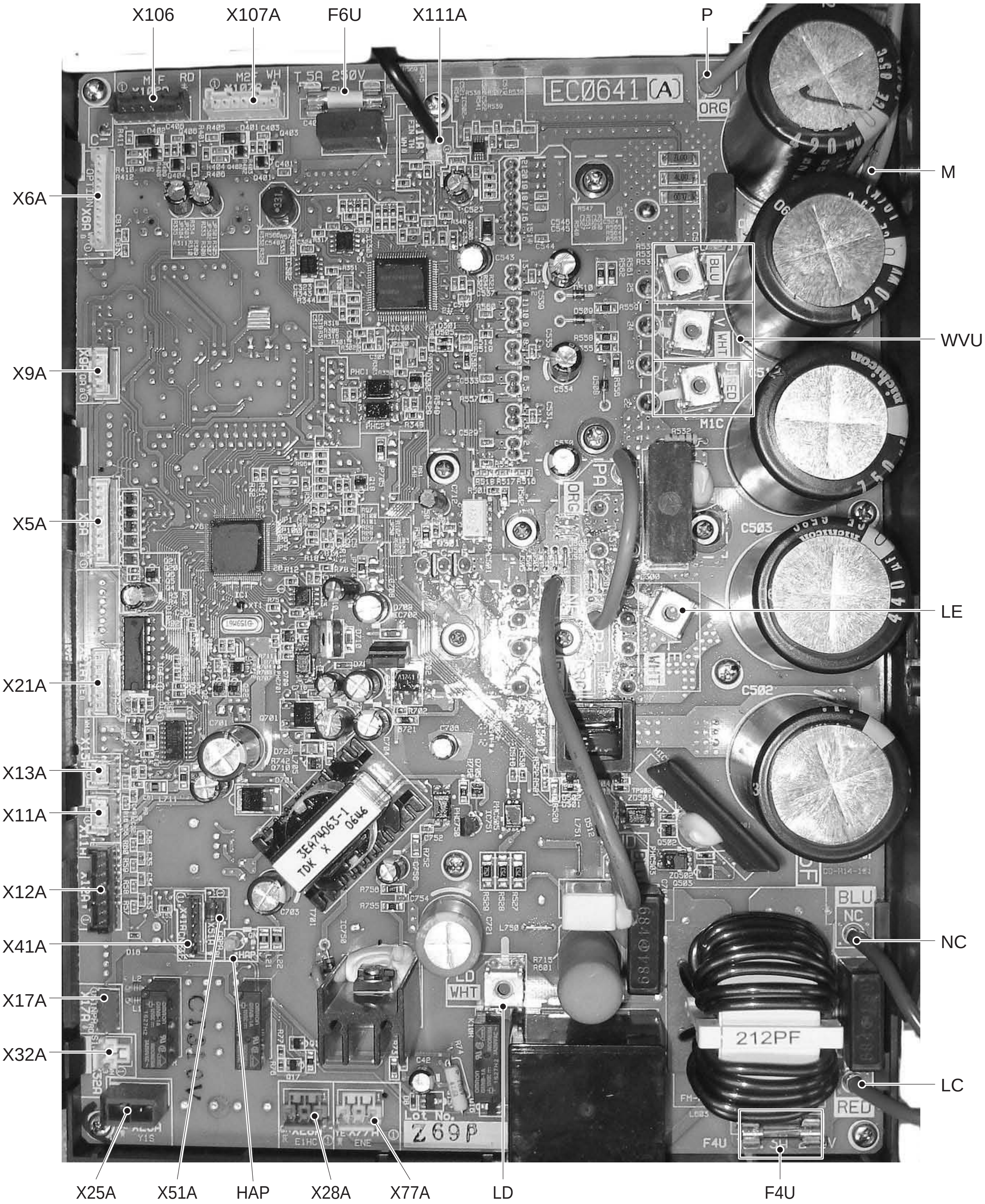
Control & inverter PCB (A1P

The illustration below shows the PCB connectors.



Control & inverter PCB (A1P)

The picture below shows the PCB connectors.



1

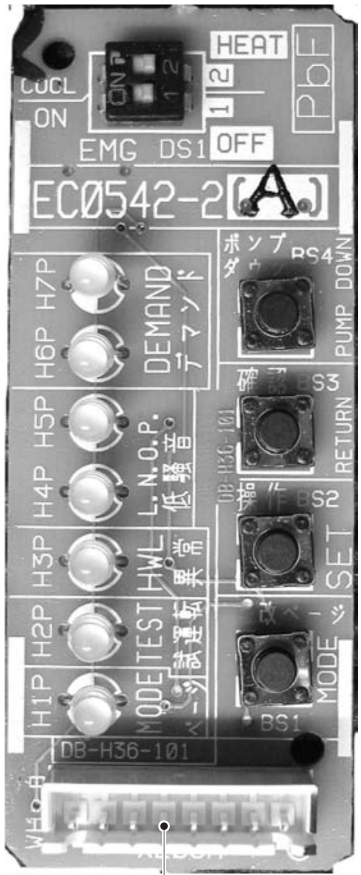
Connectors

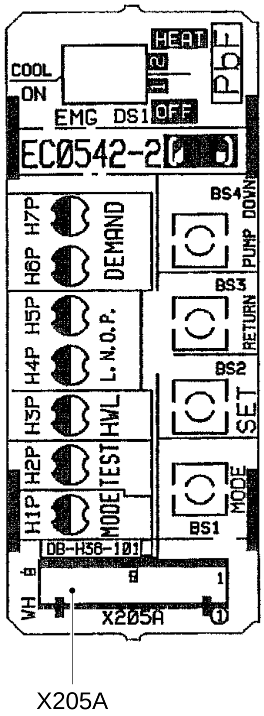
The table below describes the PCB connectors.

Connector	Connected to	Description
X5A	X205A	On service PCB
X6A		For optional PCB KRP58M51
X9A	X809A	On communication PCB
X11A	R1T	Air thermistor
X12A	R2T ~R5T	Coil thermistor
X13A	R6T	Discharge pipe thermistor
X17A	S1NPH	Suction pipe thermistor
X21A	Y1E	Expansion valve
X25A	Y1S	4-way valve
X28A	E1HC	Crankcase heater
X31A	S1PL	Low pressure switch
X32A	S1PH	High pressure switch
X51A		Connector for spare parts adaptor
X77A		For optional PCB KRP58M51
X106A	M1F	Fan motor
X107A	M2F	Fan motor
X111A	R10T	Fin thermistor
HAP	-	Indication CPU / Power supply
MC-ML	MB-LB	On noise filter
M-P	C4	Capacitor
F4U	-	Fuse 6.3A/250V for Y1S, E1HC
F6U	-	Fuse 5.0A/250V for M1F, M2F
U-V-W	M1C	Compressor
LE-LD	L1R	Reactor coil

Service PCB (A2P)

The illustration below shows the PCB connectors.





X205A

Connectors

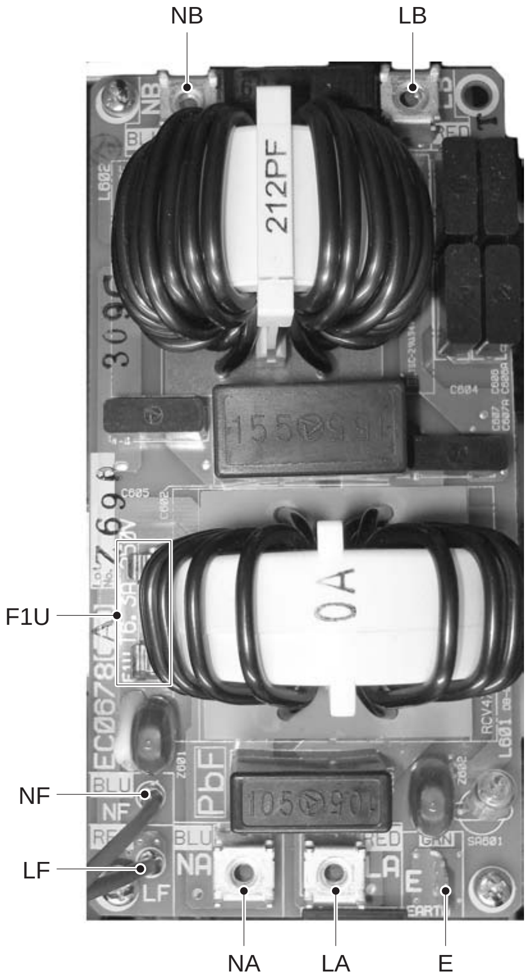
The table below describes the PCB connectors.

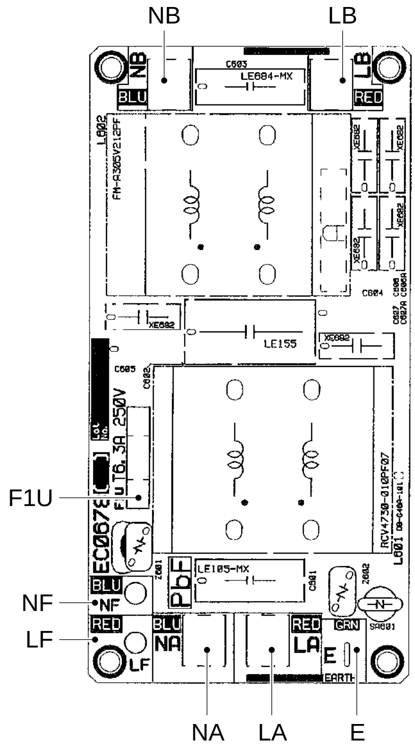
Connector	Connected to	Description
X205A	X5A	Inverter & control PCB

1

Noise filter PCB (A3P)

The illustration below shows the PCB connectors.





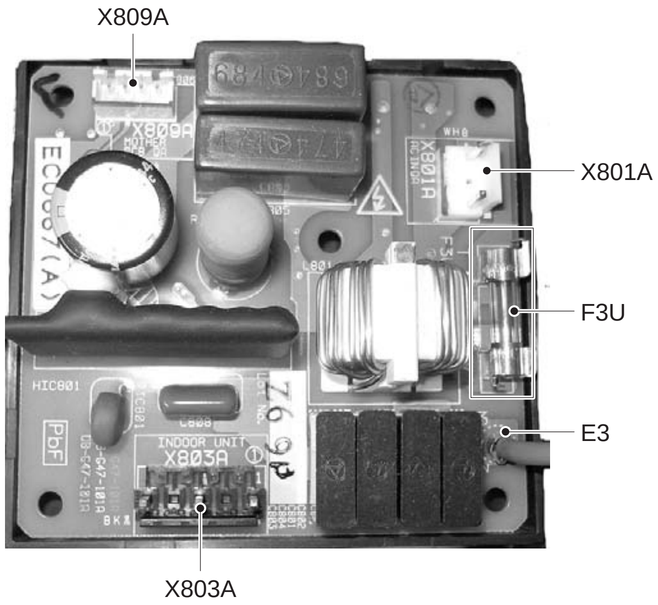
Connectors

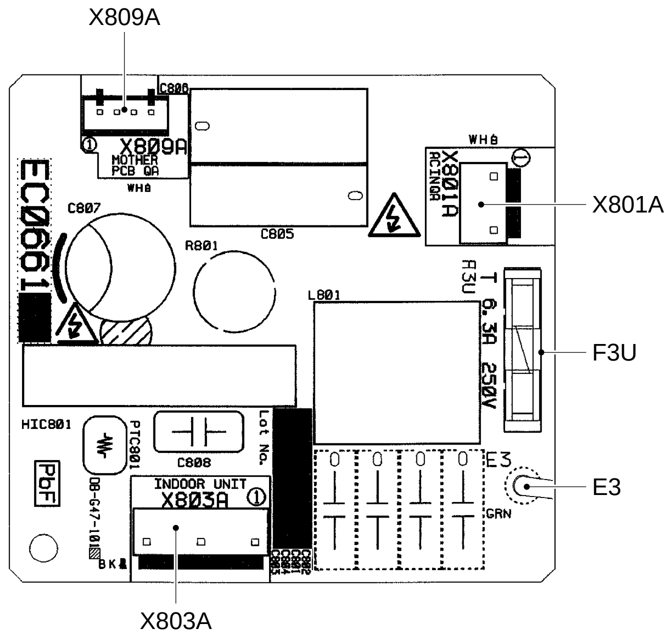
The table below describes the PCB connectors.

Connector	Connected to	Description
E	X1M	Via Z3C to X1M
F1U	-	Fuse 6.3A/250V
LA-NA	X1M	Power supply 1~ 230V
LB-NB	LC-MC	Inverter and control PCB
LF-NF	X801A	Communication PCB

Communication PCB (A4P)

The illustration below shows the PCB connectors.





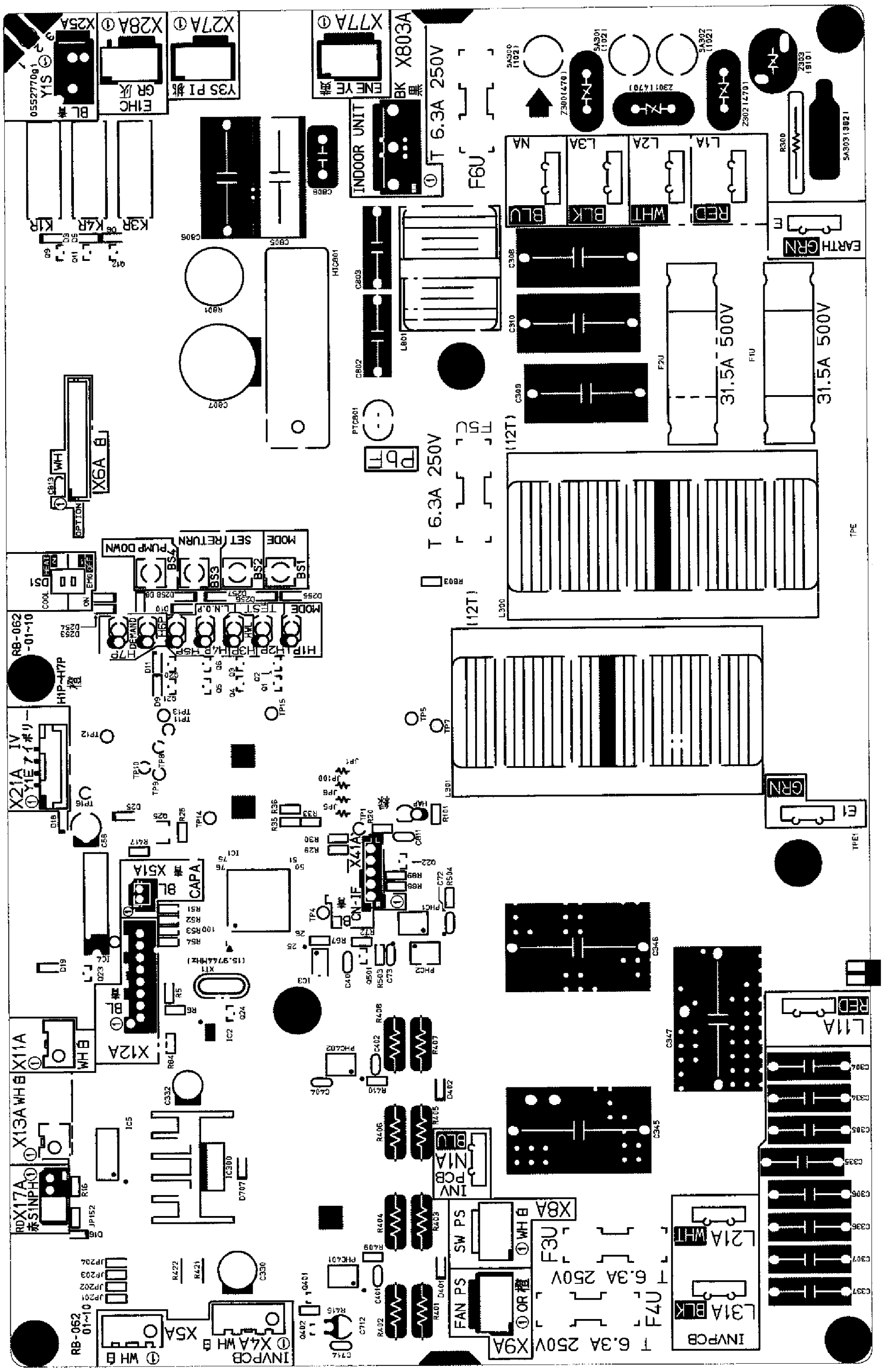
Connectors

The table below describes the PCB connectors.

Connector	Connected to	Description
X801A	MF-LF	Noise filter PCB
X803A	W1M (1, 2, 3)	To hydro-box
X809A	A1P main	Inverter and control PCB
E3	X1M	Earth
F3U	-	Fuse 6.3A/250V

7.3 PCB Layout for ERHQ011~016AAW1*

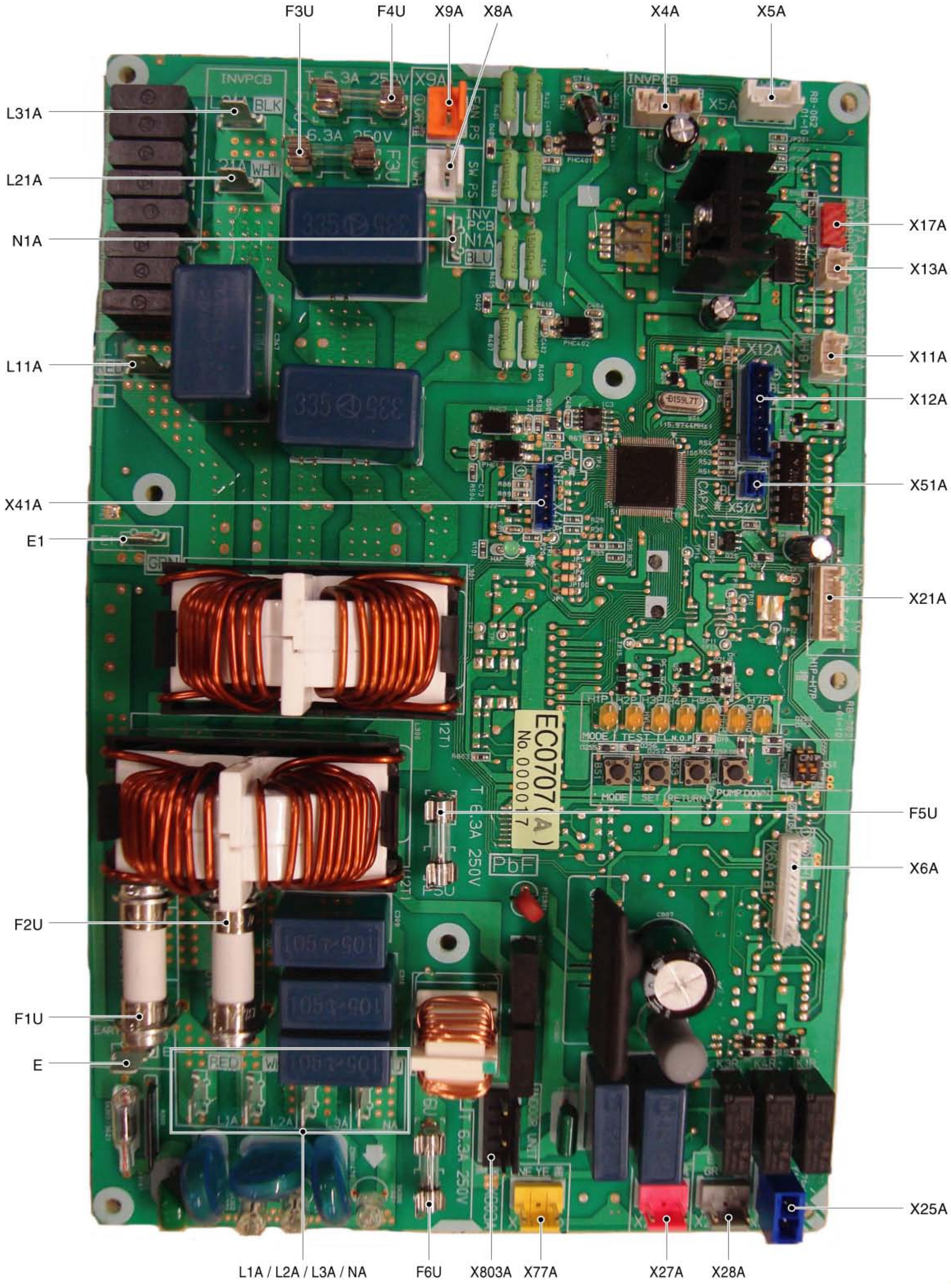
Control PCB (A1P) The illustration below shows the PCB connectors.



1

Control & inverter PCB (A1P)

The picture below shows the PCB connectors.



1

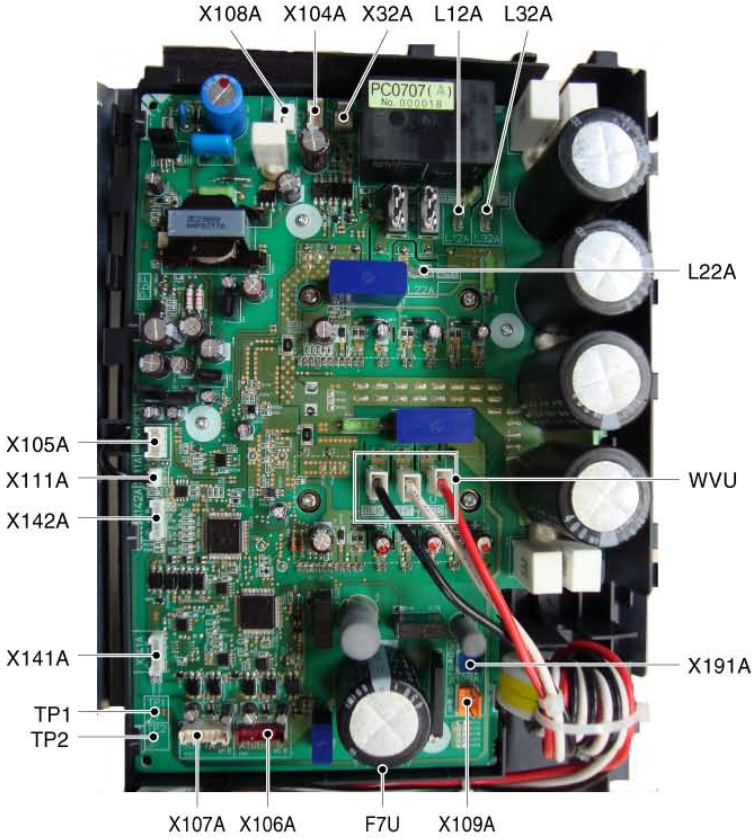
Connectors

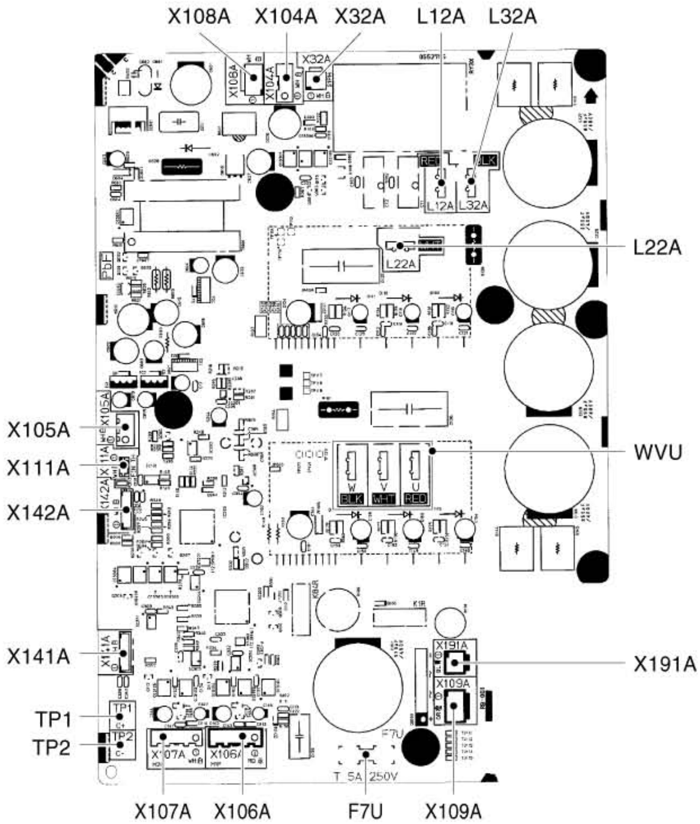
The table below describes the PCB connectors.

Connector	Connected to	Description
X9A	X109A	On Inverter PCB (Diode module fan motor)
X8A	X108A	On Inverter PCB (PS Module)
X803A	X1M (1-2-3)	Towards Hydrobox
X77A	-	For Optional PCB
X6A	-	For Optional PCB
X5A	X105A	On Inverter PCB
X51A		Connector for spare capacity adaptor
X4A	X104A	On Inverter PCB
X41A		
X28A	E1HC	Crankcase heater
X27A	Y3S	Liquid Injection Valve
X25A	Y1S	4-way valve
X21A	Y1E	Expansion valve
X17A	S1NPH	Pressure sensor
X13A	R6T	Liquid thermistor
X12A	R2T-R5T	Discharge-Suction-HEX-HEX middle- thermistor
X11A	R1T	Ambient thermistor
N1A	N1B	On Noise filter A3P
L31A	L31B	On Noise filter A3P
L21A	L21B	On Noise filter A3P
L1A~NA	X1M (L1-L2-L3-N)	Towards main power supply
L11A	L11B	On Noise filter A3P
F6U	-	Fuse 6.3A / 250V for Hydrobox
F5U	-	Fuse 6.3A / 250V for Y1S-Y3S-E1HC-
F4U	-	Fuse 6.3A / 250V for M1F-M2F (AC)
F3U	-	Fuse 6.3A / 250V for PS Module A2P
F2U	-	Fuse 31.5A / 250V for Inverter Module L1 A2P
F1U	-	Fuse 31.5A / 250V for Inverter Module L2 A2P
E1	GRN	Protective earth
E	GRN	Protective earth
HAP	-	Indication CPU/power supply

Inverter PCB (A2P)

The illustration below shows the PCB connectors.





1

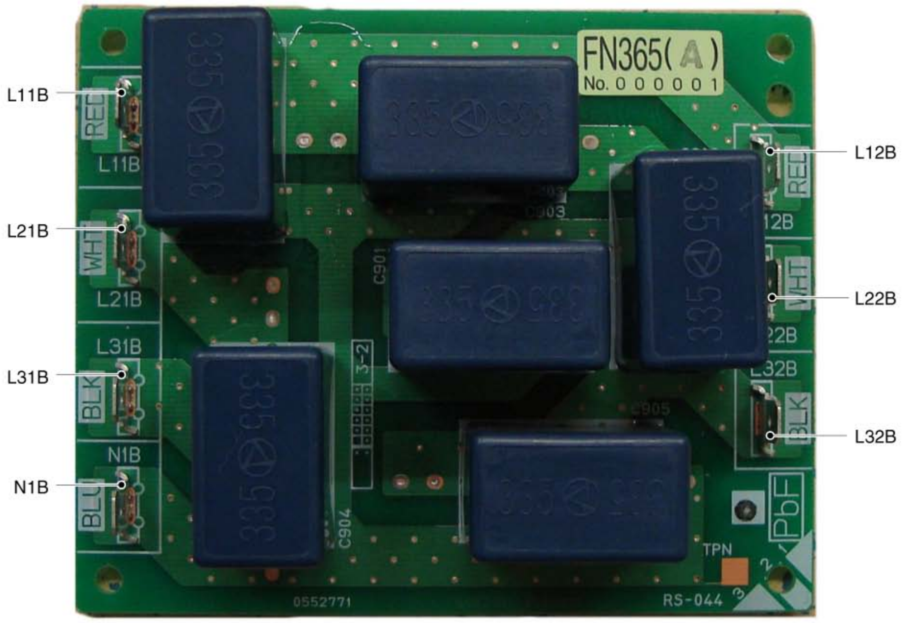
Connectors

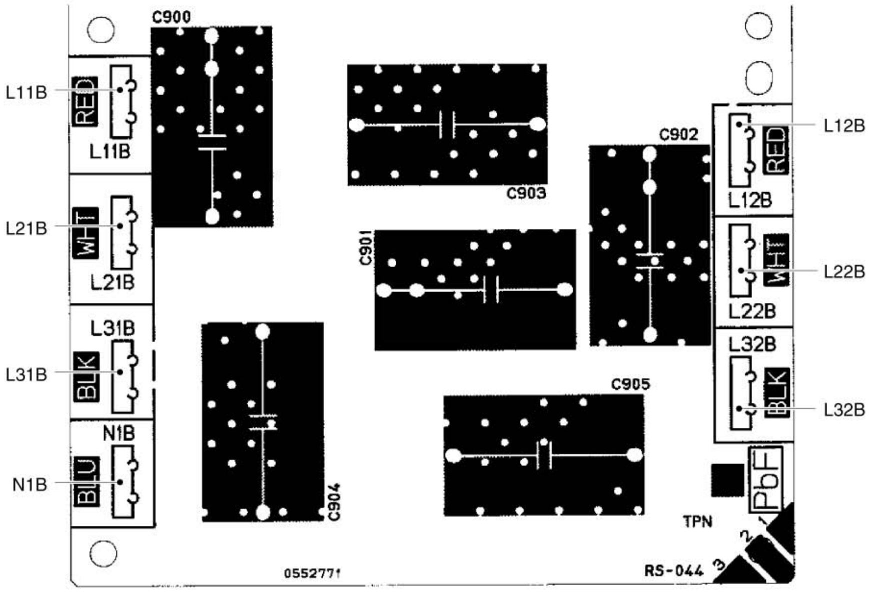
The table below describes the PCB connectors.

Connector	Connected to	Description
X108A	X8A	On Control PCB
X104A	X4A	On Control PCB
X32A	S1PH	High pressure switch
L12A	L1R	Reactor inverter M1C
L32A	L2R	Reactor inverter M1C
L22A	L3R	Reactor inverter M1C
WVU	M1C	Compressor
X191A	L4R	Reactor inverter M1F-M2F
W109A	X9A	On Control PCB
F7U	-	Fuse 1.0A / 250V for M1F-M2F (DC)
X106A	M1F	Fan Motor upper
X107A	M2F	Fan Motor lower
TP1	-	Inverter DC checkpin
TP2	-	Inverter DC checkpin
X141A	-	-
X142A	-	-
X111A	R7T	Inverter Fin thermistor
X105A	X5A	On Control PCB

Noise filter PCB (A3P)

The illustration below shows the PCB connectors.





Connectors

The table below describes the PCB connectors.

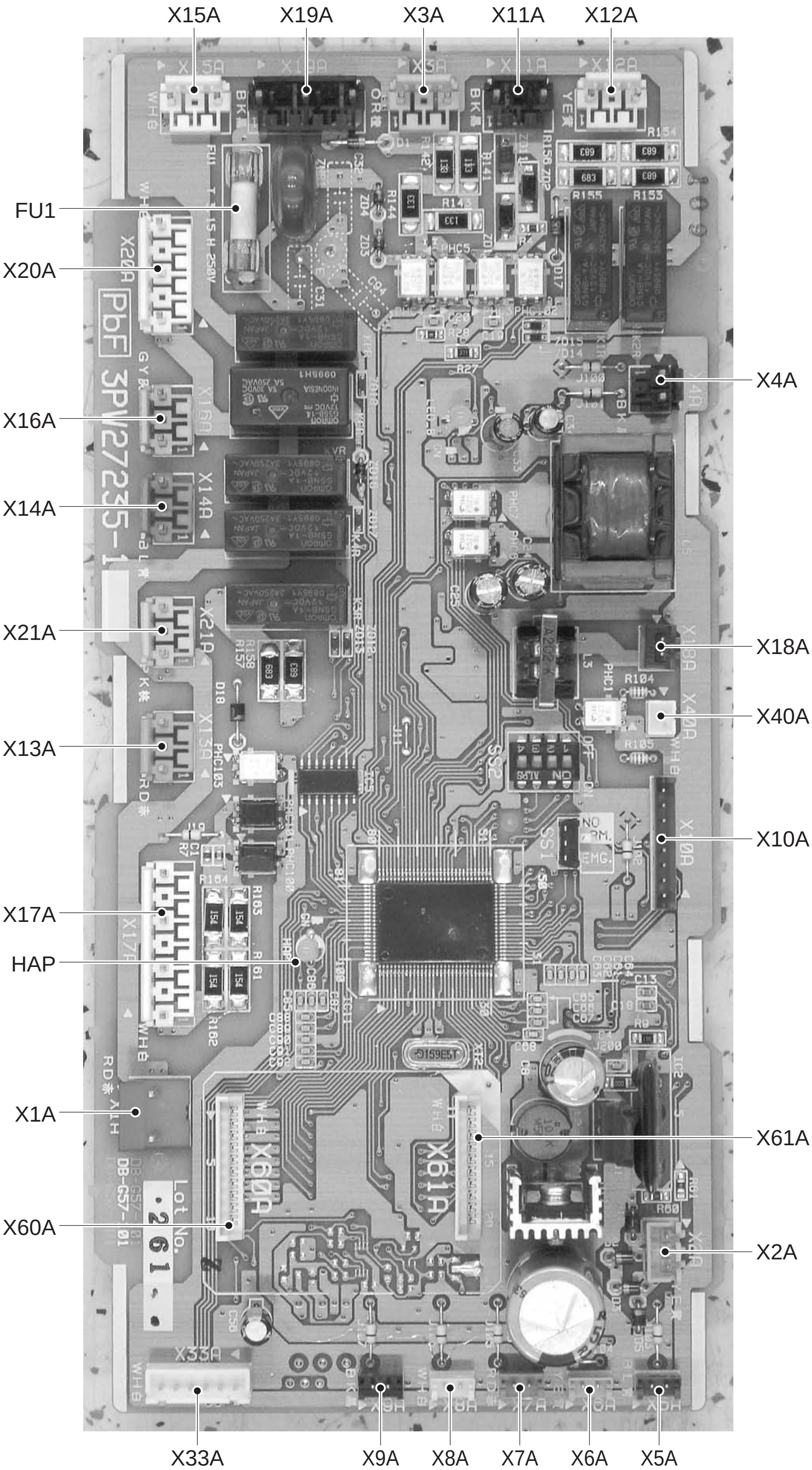
Connector	Connected to	Description
L11B	L11A	On Control PCB (L1)
L21B	L21A	On Control PCB (L2)
L31B	L31A	On Control PCB (L3)
N1B	N1A	On Control PCB (N)
L12B	L1R	Reactor inverter M1C
L22B	L2R	Reactor inverter M1C
L23B	L3R	Reactor inverter M1C

1

7.4 PCB Layout for EKHBH(X)016

Main PCB

The illustration below shows the PCB connectors.



Connectors

The table below describes the PCB connectors for EKHBH(X).

Connector	Connected to	Terminals	Description
X1A	TR1	-	Transformer (220V/24V)
X2A	TR1	-	Transformer (220V/24V)
X3A	K5M (13-14)	-	Input Thermal protector Back-up heater via K5M contact
X4A	S1L	-	Flowswitch
X5A	R1T (A1P)		Outlet water heat exchanger thermistor
X6A	R2T		Outlet water backup heater thermistor
X7A	R3T		Refrigerant liquid side thermistor
X8A	R4T		Inlet water thermistor
X9A	R5T		DHW thermistor (DHW option)
X10A			VRV checker connection
X11A	K1M		Contactor backup heater step 1
X12A	K2M		Contactor backup heater step 2
X13A	K3M		Contactor booster heater
X14A	K7M	-	EKSOLHWAV1 pump relay
X15A	K4M	-	Pump relay
X16A	M3S	X2M 9-10	3-way valve: floorheating / DHW
X17A	PCB (A3P)	X2M 1-2-3-4	Room thermostat (EKRTR / EKRTW)
X18A	PCB (A2P)	-	Remote controller PCB
X19A	ERHQ	X1M 1-2-3	Terminal nr X1M 1-2-3: internal wiring to outdoor
X20A	M2S	X2M 5-6-7	2-way valve for cooling
X21A	Q2L	X2M 13-14	Thermal protector booster heater
X33A	EKRP1HB	CN2	Option PCB EKSOLHWAV1 / alarm-operation signal
X40A	-	-	Not applicable (not in use)
X60A	-	-	Not applicable (not in use)
X61A	-	-	Not applicable (not in use)
FU1	-	-	Fuse 3.15A/250V for PCB
HAP	-	-	Indication CPU / Power supply

Part 2
Functional Description

2

What is in this part?

This part contains information on the functions used to control the system. Understanding these functions is vital when diagnosing a malfunction that is related to the functional control.

Overview

This part contains the following chapters:

1 General Functionality

2

1.1 What Is in This Chapter?

Introduction

This chapter will explain all functions not related to the compressor frequency control, outdoor unit fan control and expansion valve control. These functions have been programmed to ensure the unit's reliability and lifetime, enable the operation in case of malfunction.

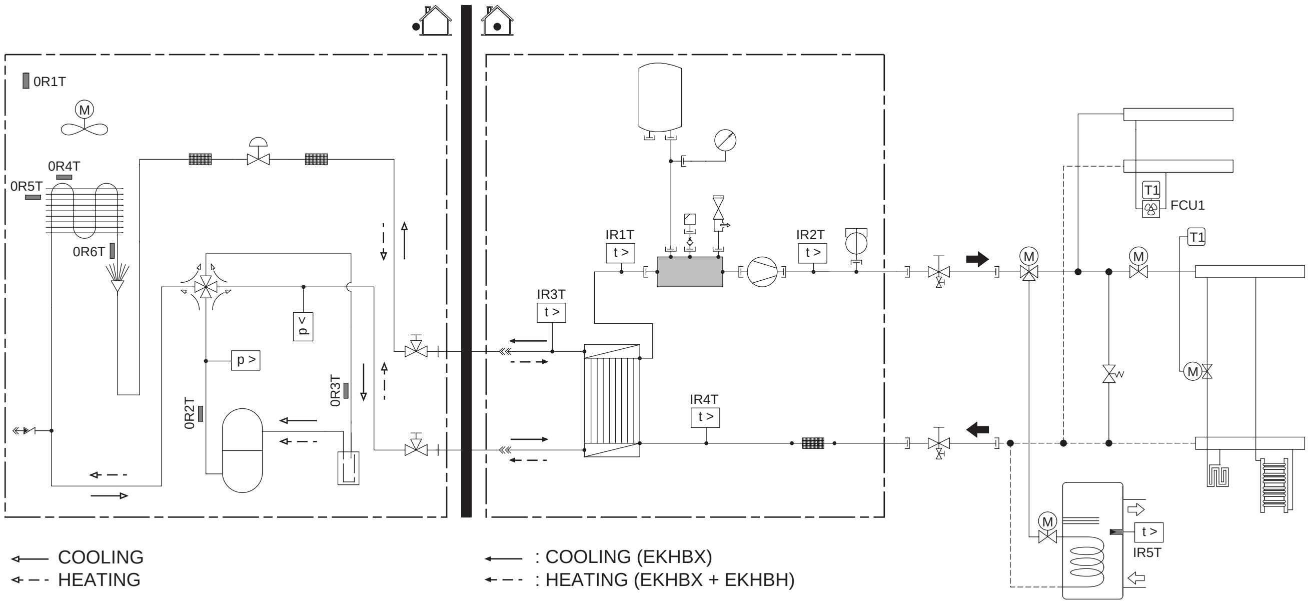
Overview

This chapter contains the following topics:

1.2 Function of Thermistors

Locating of the thermistors

V3(8)

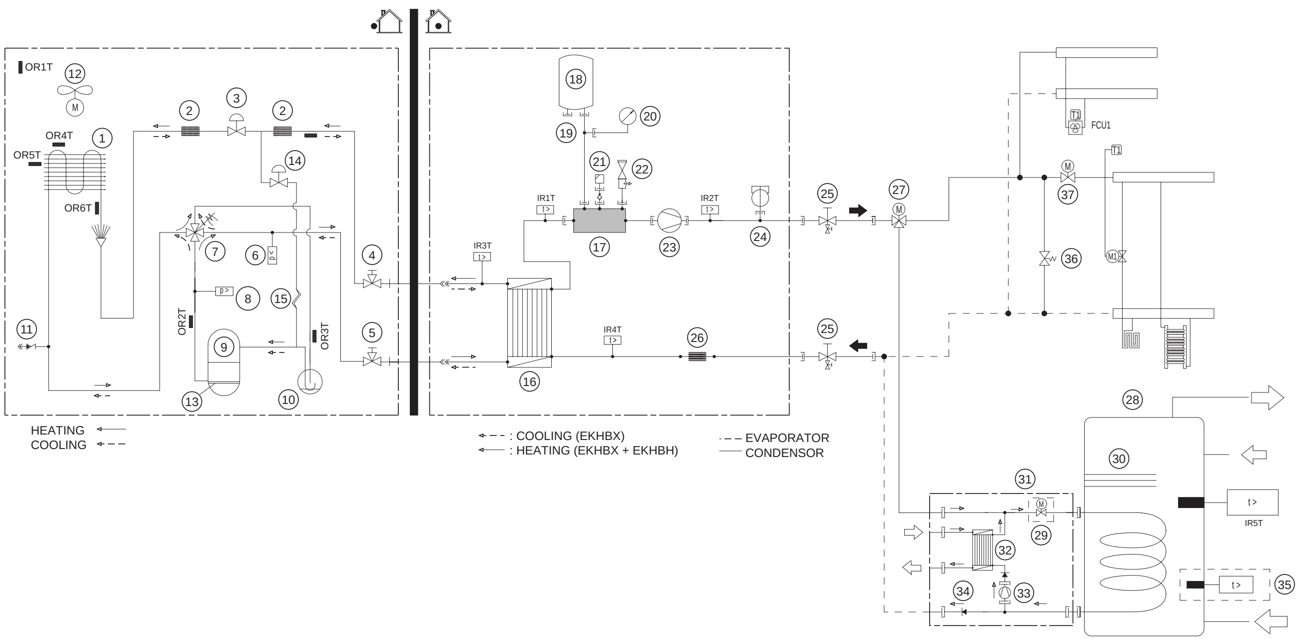


COOLING
HEATING

: COOLING (EKHBX)
: HEATING (EKHBX + EKHBH)

EVAPORATOR
CONDENSOR

W1(8)



Functions of the thermistors

Location	Thermistor	Mode	Function
Outdoor heat exchanger	OR4T	Cooling	■ Inverter current protection control
		Heating	■ Inverter current protection control ■ Defrost control
Outdoor ambient	OR1T	Cooling	■ Outdoor fan speed control ■ PMV control ■ Pressure difference control ■ Overall current protection control
		Heating	■ Defrost control ■ Forced thermostat OFF ■ Overall current protection control
Discharge pipe	OR2T	Cooling	■ Discharge superheat control ■ Expansion valve control ■ Crankcase heater
		Heating	■ Expansion valve control ■ Crankcase heater
Suction pipe	OR3T	Cooling	■ Expansion valve control (SH control)
		Heating	■ Expansion valve control (SH control) ■ Suction pipe superheat protection control
Inverter power module	OR10T (V3) OR7T (W1)	Cooling	■ Outdoor fan speed control ■ Inverter fin temperature control ■ Pressure difference control
		Heating	■ Inverter fin temperature control
Outdoor heat exchanger middle temperature	OR5T	Cooling	■ Calculate the expected high pressure ■ Outdoor fan speed control
		Heating	■ Calculate the expected low pressure
Liquid refrigerant temperature	OR6T	Heating	■ Calculate the subcool ■ Expansion valve control
Outlet water temperature after PHE	IR1T	Cooling Heating	■ Controlling the H/P operation (thermostat ON/OFF, capacity control) ■ Freeze prevention control
Outlet water temperature after BUH	IR2T	Heating	■ Controlling the BUH operation (thermostat ON/OFF, capacity control)
Liquid refrigerant temperature	IR3T	Cooling	■ Compressor frequency control (target Te) ■ Freeze-up control
		Heating	■ Compressor frequency control (target Tc) ■ Hot start control ■ Peak cut-OFF
Inlet water temperature	IR4T	Heating	■ Start up control (BUH), temperature drop prevention (defrost) ■ Freeze prevention control
DHW temperature	IR5T	DHW	■ Controlling the H/P, BSH operation (thermostat ON/OFF), DHW priority instruction

1.3 Forced Operating Mode (Emergency Operation)

Purpose

The table below describes the purpose of the forced operating mode.

If...	Then...
■ R/C is defective ■ Indoor PC board is defective ■ Outdoor PC board is defective	Forced operating mode can be used to go to cooling or heating. In forced operating mode, the compressor is forced to operate until the defective indoor or outdoor PC board is back online.

Starting conditions

You can operate the system manually by changing the emergency switch on the outdoor PC board from "normal" to "emergency". When the system is operating in "emergency" it can not control the water temperature. Compressor will operate with fixed capacity request.

The outdoor unit must be set to "emergency" while the power is off.

Ending conditions

You can end the emergency operation by changing the "emergency" switch back to "normal" while the power is OFF.

Emergency operation

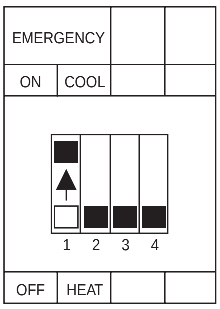
Below table explains what will happen when the switch is set to "emergency":

Changing the switch to "emergency" for the…	Switches ON the…
Hydro-box	■ Pump
Outdoor unit	■ Compressor ■ Outdoor fan(s)

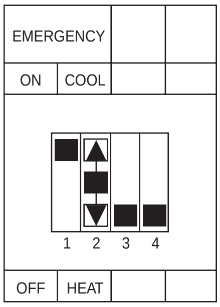
How to set Emergency operation

To set emergency operation, proceed as follows:

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Turn OFF the power.</td></tr>
<tr><td>2</td><td>Switch ON the emergency switch on the outdoor PCB.



</td></tr>
</table>

Step	Action
3	Set the emergency switch on the outdoor PCB to the forced mode you prefer (Cooling or Heating). 
4	Turn ON the power supply.

Active components

Component	Forced cooling	Forced heating	Forced defrosting
Compressor	ON	ON	ON
4-way valve	OFF	ON	OFF
Outdoor unit fan	H fan speed	H fan speed	OFF
Hydro-box pump	ON	ON	ON

Attention!

Confirm the operation of the hydro-box pump during forced operation.

Additional info

- During emergency operation, hydro-box should be active and remote controller will show actual error code (reason for emergency mode by outdoor).
- If a safety device is activated during emergency, all actuators are turned OFF
  - Freeze-up prevention (Cooling)
  - High pressure control (Heating)
- In cooling, the unit runs for 20 minutes and then stops for 10min in order to avoid freeze-up of the indoor coil.
- In heating, defrost is activated for 3 minutes once every hour.
- Emergency operation can not be carried out when the PC board itself is defective.
- The unit will not regulate the temperature during emergency operation.
- Change the position of the emergency switch only when the power is turned off.
- In case outdoor unit broken/no outdoor unit connected:
  - The hydro-box will go automatically in emergency operation.
    The space heating and/or Hot water operation will be performed by the backup or/and Booster heater only.
- Emergency operation by outdoor unit will only operate in case a malfunction is applicable.

2

1.4 Simulated Operation Function

General description

In case of a thermistor malfunction, simulated operation is performed in two different ways as shown below even while the malfunction is detected.

A. Operation continues while the malfunction code is displayed on the remote controller.

Applicable thermistors:

- Outside air temperature thermistor
- Heat exchanger distribution pipe thermistor (in cooling operation only)
- Intermediate heat exchanger thermistor (in heating operation only)
- Liquid pipe thermistor
- Indoor heat exchanger thermistor

B. Operation continues even the malfunction is detected. The remote controller displays "Inspection/Test Run". Only when the button is pushed, the malfunction code appears.

Applicable thermistors:

- Radiation fin thermistor

Note

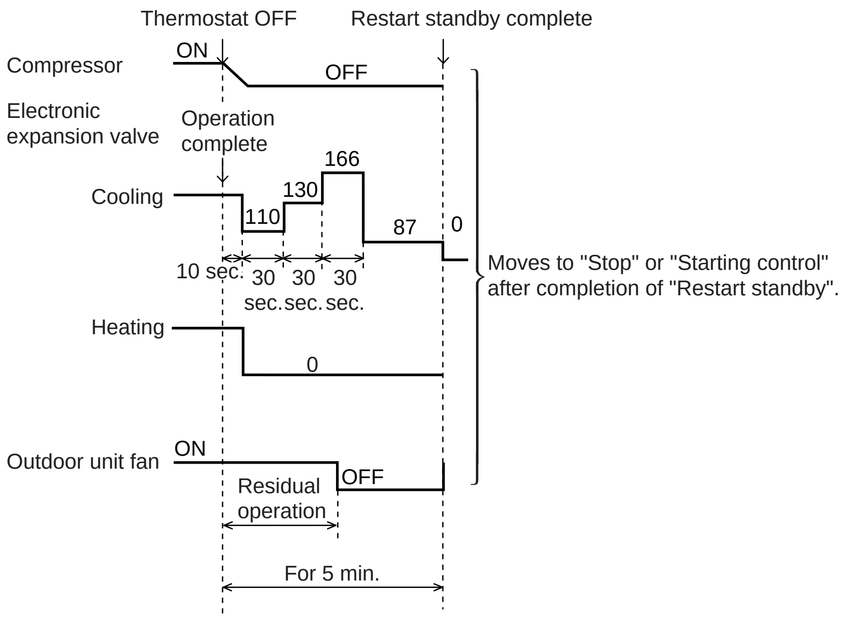
In case of a thermistor malfunction other than A and B above, a malfunction stop is made and no simulated operation is carried out.

Applicable thermistors:

- Suction pipe thermistor
- Discharge pipe thermistor
- Heat exchanger distribution pipe thermistor (in heating operation only)
- Intermediate heat exchanger thermistor (in cooling operation only)

1.5 Restart Standby

To prevent compressor from frequent ON/OFF and equalize pressure in refrigerant line, conducts forced thermostat OFF for 5 minutes after compressor stopping. Moreover, outdoor unit fan conducts residual operation for a period of time to expedite equalization and prevent refrigerant from entering in evaporator.



2

1.6 Automatic Restart

Purpose

The purpose of the auto-restart function is to automatically resume the same operating mode as when the unit was operating when the power supply is restored after a power failure.

Do not use the "Automatic Restart" function to daily start/stop the unit.

Precautions when turning OFF power

- When you have to turn OFF the power supply in order to carry out maintenance, make sure to turn the remote control's ON/OFF switch OFF firstly.
- If you turn OFF the power supply while the remote control's ON/OFF switch is still ON, the "automatic restart function" automatically starts the hydro-box pump immediately and the outdoor unit fan starts automatically 3 minutes after the power supply is turned back ON.
- Do not start/stop the unit by disconnecting the power supply. Stop the unit by stop commando from the remote controller or optional controller before disconnecting the power supply. Be sure that the compressor and the outdoor fans are stopped before disconnecting the power supply so the "Refrigerant Recovery function" has been finished correctly.
- When restarting the unit after the power was disconnected for a longer period leave the unit OFF with the power supply connected for about half an hour (See "Crankcase Heater Control").

1.7 Forced Thermostat OFF

Outline

The unit will perform the forced thermostat off function in following conditions:

Condition 1 (Cooling)

- Thermostat off due to freeze-up prevention.
  Based on the judgment to prevent the indoor heat exchanger from freezing, the thermostat is forcedly turned OFF.
- Thermostat off due to low outdoor temperature

  When the outside temperature is <10°C DB in Coding mode, the unit will conduct a forced thermostat off operation to protect the system.

Condition 2 (Heating)

Thermostat off due to low / high outdoor temperature.

- When the outside temperature is for W1 < -25°CDB / > 35°CDB and for V3 < -20°CDB / > 35°CDB in heating mode, the unit will conduct a forced thermostat off operation to protect the system.

Condition 3 (Hot water operation)

Thermostat off due to low / high outdoor temperature

- When the outside temperature is for W1 < -25°CDB / > 35°CDB and for V3 < -20°CDB / > 35°CDB in Hot water operation mode, the unit will conduct a forced thermostat off operation to protect the the system.

Note

See also "1.12–Freeze Prevention Function" on page 2–17.

2

2

1.8 Test Run Control

Purpose

When operating the units for the first time after installation, the unit will - depending on the selected operation mode - perform a test run operation first.

Automatic test run

When the unit is put into operation (by pressing the button) for the first time, the system will automatically perform a test run in cooling mode. The test run will take up to 3 minutes, during which no specific indication is given on the user interface.

During the automatic test run, it is important to ensure that the water temperature does not drop below 10°C, which might activate the freeze-up protection and thereby prevent the test run to finish.

Should the water temperature drop below 10°C, press the ❄/❄ button so the ❄ icon is displayed. This will active the backup heater during the automatic test run and raise the water temperature sufficiently.

If the automatic test run has ended successfully, the system will automatically resume normal operation.

If there are misconnections or malfunctions, an error code will be displayed on the user interface. To resolve the error codes, see "Troubleshooting".

Note

- When the outdoor unit is put into pump down operation (see the outdoor unit installation manual), the automatic test run flag will be cleared. The next time the system is put into operation, the automatic test run will be executed again.
- When running in test run mode, the unit will sense on site installation parameters (e.g.: failure to open stop valves,..) and indicate the applicable malfunction code if required.
- If the remote controller shows E3, E4 or L8 as an error code, it is possible that the stop valve is closed.
- Check the inter unit branch wiring connection (1-2-3 wiring) when error code U4 or UF is displayed on the remote controller.
- When error code U2 is displayed on the remote controller, check for voltage imbalance.
- When error code L4 is displayed on the remote controller, it is possible that the air flow passage is closed.
- When there is no error code displayed, cooling operation continues without interruption. (However, this control is once again performed after refrigerant is recovered by means of the pump down switch and at the time of the first operation after the outdoor PC board replacement.)

1.9 4-way Valve Control

Purpose

The purpose of the 4-way valve control is to control how the superheated refrigerant passes through the 4-way valve. The 4-way valve control carries out the changeover switching of the 4-way valve. This changeover switching is only carried out during operation, because a certain pressure difference is required to move the internal cylinder.

When...	Then the 4-way valve connects the outlet of the compressor with...
Cooling	Outdoor heat exchanger
Heating	Indoor heat exchanger

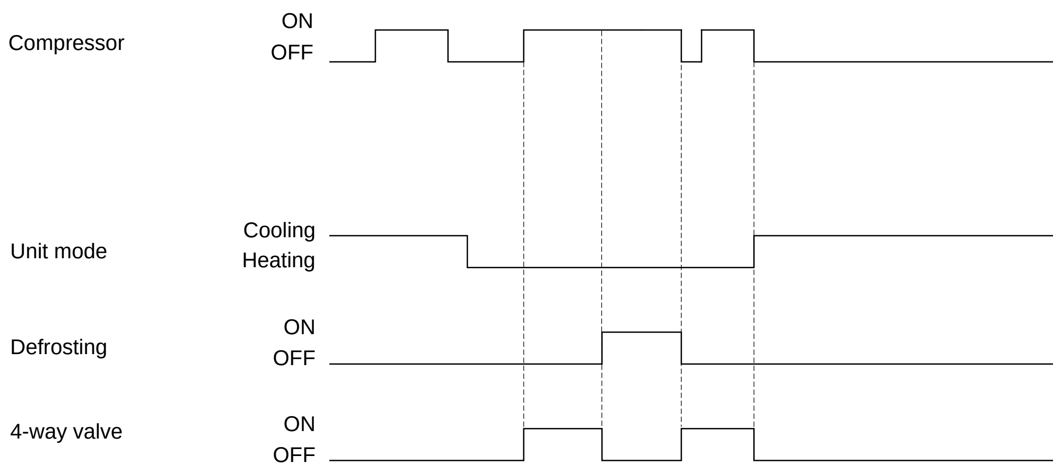
Method

The table below describes the 4-way valve control operation.

In...	The 4-way valve is...
■ Heating, except for defrosting	ON
■ Cooling ■ Defrosting	OFF

Time chart

The time chart below illustrates the 4-way valve control.



1.10 Pump Down And Forced Defrost Operation

Outline

This unit is equipped with an automatic pump down operation which will collect all refrigerant from the field piping and hydro-box in the outdoor unit. To protect the environment, make sure to perform the following pump down operation when relocating or disposing of the unit.

2

Note

The outdoor unit is equipped with a low pressure sensor to protect the compressor by switching it off. Never short-circuit the low pressure sensor during pump down operation!

Procedure

1 Stop space and DHW demand (Red LED OFF and shower icon not displayed) and select Max pump speed.

2 Switch-OFF / ON the power supply of the outdoor unit.

3 Activate "pump down/forced defrost" on outdoor PCB via BS4, press for at least 5 seconds.

4 The compressor and outdoor fan will start automatically.

5 Request space heating via remote controller on hydro-box asap, in order to activate the circulation pump (prevent PHE freeze-up) and allow BUH operation if required.

6 **a.** Forced defrost can be stopped by pressing BS4 on outdoor PCB.

b. Once operation stops (after 3 to 5 minutes), close the liquid and the gas stop valve.

7 Pump down is now finished. U4 may be displayed on the remote controller, this is not a malfunction.

8 After "pump down/forced defrost" is finished or stopped, keep the circulation pump running for at least 5 minutes.

9 Switch-OFF the power supply of the outdoor unit.

Note

- Make sure that the water temperature and volume is sufficient to perform the "pump down/forced defrost" operation.
- Make sure to re-open both stop valves before restart operation of the unit.
- After a finished or stopped pump down, the unit will perform a test run at first operation (same as during commissioning).

1.11 Defrost Operation

Outline

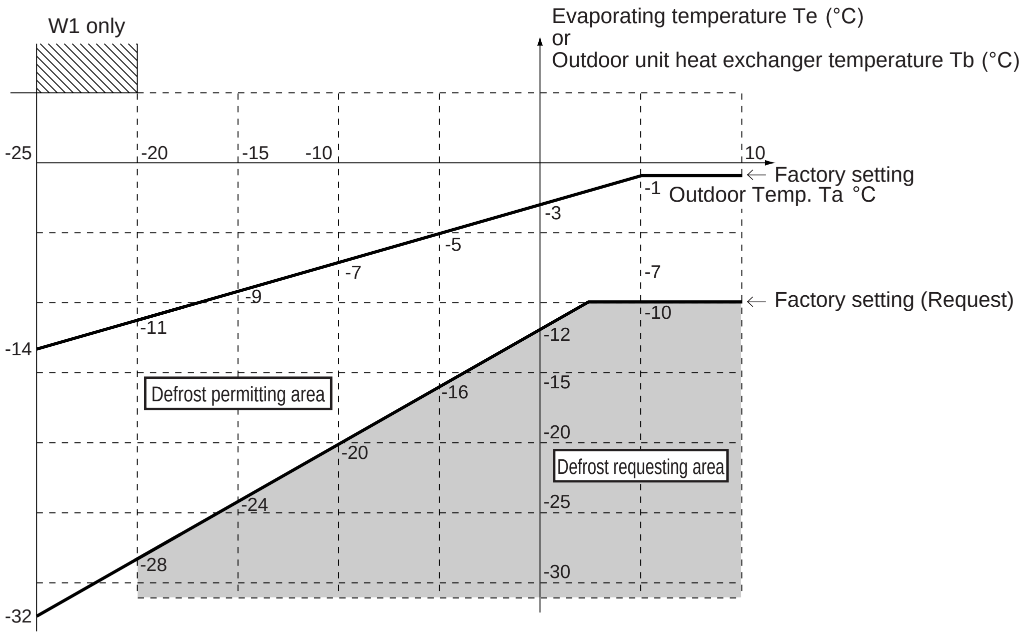
When the unit is operating in heating mode, a defrost operation will be conducted in order to avoid ice formation on the outdoor unit heat exchanger.

Defrost starting conditions

1 Defrost will start when the following conditions have been realized:

&
- Integrated compressor running time is 25 minutes or more since the completion of the previous defrost operation.

OR
- Defrost upper limit time A is met.
- Outdoor unit heat exchanger area temperature (Tb) is within the defrost requesting area.



2 Forced defrost switch “BS4”.

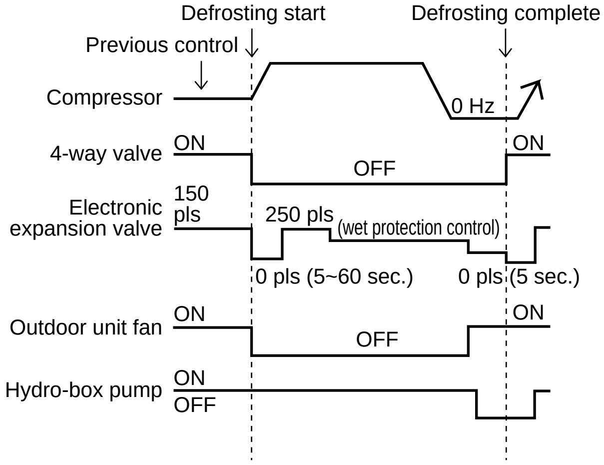
3 After one hour of heating operation in emergency operation.

Areas

Defrost upper limit A

- Outdoor temperature > -5°C : 2 hours
- Outdoor temperature ≤-5°C : 6 hours

Defrost control



Defrost ending conditions

Defrosting ends when the following conditions have been realized. Note that defrosting can be operated for 10 minutes at longest.

- OR
  - &
    - Defrost Time>1 min.
    - Tb>12°C
  - &
    - Defrost Time>1 min.
    - Water outlet temperature < / = 2,5°C
  - &
    - Defrost Time>10 min.
    - Tb>9°C
  - &
    - Defrost Time>10 sec.
    - Hp>2.45 MPa

1.12 Freeze Prevention Function

Purpose

In order to avoid formation of ice on the hydro-box heat exchanger in cooling mode, the system automatically starts up a freeze prevention cycle when a number of specific conditions are fulfilled.

Freeze Prevention start conditions

Freeze prevention start decided by the hydro-box.

Action

When start condition is met, the compressor will be forced stopped for a minimum of three minutes.

Freeze prevention - Reset conditions

After three minutes forced stop, the compressor operation permission will be released in case the outlet water temperature > outlet water setpoint + 3°C.

OR
- and
  - *Outlet water temperature <6°C
  - *or
    - ■ Evaporating temperature <-3°C [Continuously for 2 minutes]
    - ■ and
      - • Evaporating temperature <-5°C
      - • Compressor frequency ≤52Hz
      - [Continuously for 30 seconds]
- Outlet water temperature <3°C

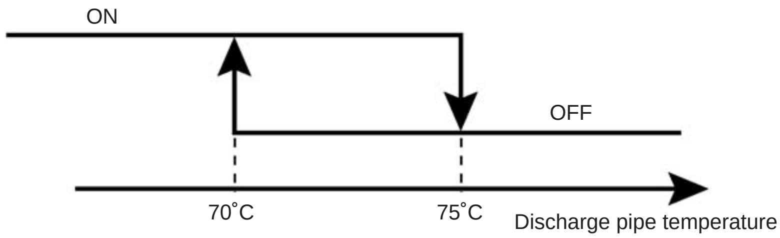
2

1.13 Crankcase Heater Control

Outline

After the compressor has been turned off, the crankcase heater control will be activated in order to avoid refrigerant from dissolving in the compressor oil.

Trigger conditions



2 Hydro-box Functional Concept

2.1 What Is in This Chapter?

Introduction

This chapter will explain more details about the various functions that are programmed for the hydro-box.

Overview

This chapter contains the following topics:

2.2 Hydro-box Pump Blockage Prevention Control

Outline

In order to prevent pump operation failure (blockage) due to no pump operation for long-term, pump will operate at regular intervals.

General

In case the pump was not operating for continuously 24 hours, pump will run for a short period.

2.3 Hydro-box Pump Operation Control

Outline

When heating / cooling and (or) domestic hot water operation is activated the pump will operate.

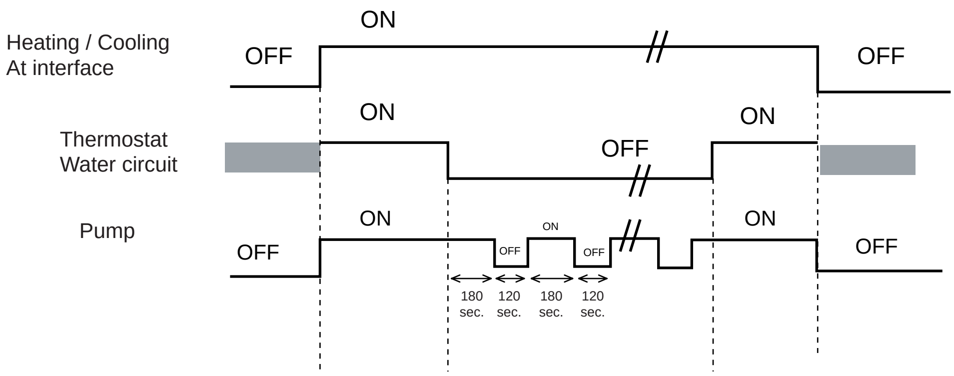
Details

The pump operation pattern is determined by some system parameters and field settings.

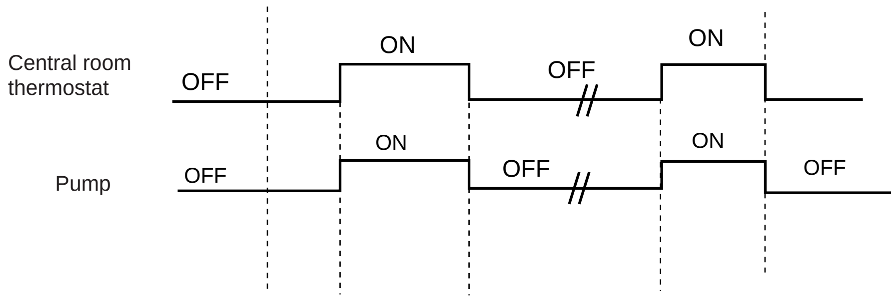
Heating / cooling mode

When the unit is put into heating / cooling operation (by pressing the ON / OFF button, LED lit - or via central room thermostat) the pump will operate according to below pattern.

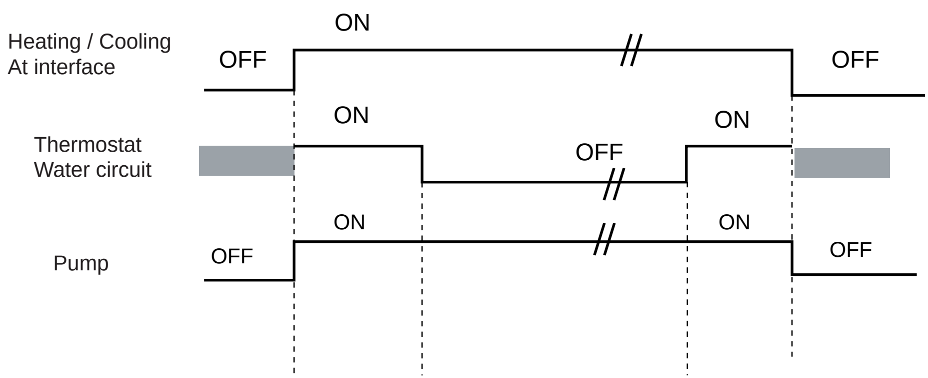
No central room thermostat connected to the hydro-box (default field setting)



Central room thermostat connected to the hydro-box



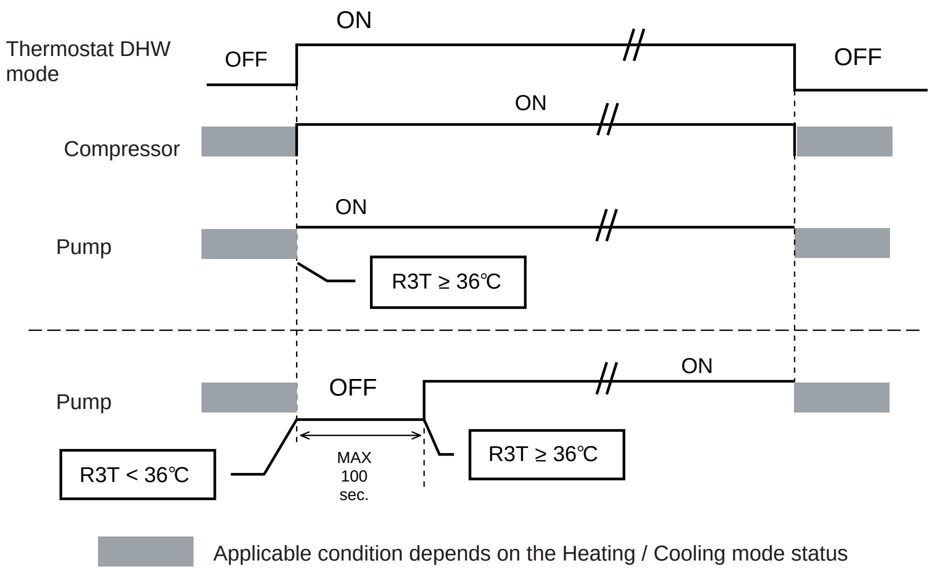
Continuously pump operation (adapted field setting)



Applicable condition is irrelevant for the pump operation status

Domestic hot water mode

When the unit is put into domestic hot water [DHW] operation (by pressing the shower button, shower icon is displayed) the pump will operate according to below pattern.



Remark

- In case the outdoor unit is ERHQ011~16, the pump will stop just before compressor start up. This function is applicable at continuously pump operation as well.
- Pump operation at domestic hot water mode is independent on the heating / cooling mode and related setting.
- Pump will continue for 1 minute in case unit is stopped (via ON / OFF button or central room thermostat) and BUH was active.
- Central room thermostat determines operation mode (cooling or heating).

2.4 Defrost control

Defrost operation during space heating operation

Conditions during defrost cycle:

- Outdoor demand operation mode is heating
- Backup heater is based on BUH heating thermostat-ON / OFF state
- Three-way valve is space heating side
- Two-way valve is open
- Pump on and after defrost cycle keeps on for 6 minutes additionally
- Booster heater is based on BSH domestic hot water heating thermostat-ON / OFF state

Remark

During additional pump operation of 6 minutes. Pump operation signal is NOT displayed on the interface.

Defrost operation during domestic hot water heating defrost

Conditions during defrost cycle:

- Outdoor demand operation mode is heating
- Backup heater is OFF
- Three-way valve is sanitary water heating side
- Two-way valve hold last state
- Pump ON and after defrost cycle keeps on for 6 minutes additionally
- Booster heater is BSH sanitary water heating thermostat-ON / OFF state

Remark

During additional pump operation of 6 minutes. Pump operation signal is NOT displayed on the interface.

2

2.5 Cooling operation

Cooling condition ON

& [When the water temperature zone > zone B ($\Delta T > 0$)
No hot water heating priority instruction]

Cooling condition OFF

or [
& [When the water temperature zone = zone A ($\Delta T = -1$)
or [Hot water heating priority instruction
No hot water heating priority instruction]]
& [When the water temperature zone > zone B ($\Delta T > 0$)
Hot water heating priority instruction]
]

ΔT = outlet - target

Remark Condition ON indicate that H/P will operate in cooling mode.

Condition OFF indicate that H/P will not operate in cooling mode.

2.6 Heating operation

Heating condition ON

& [When the water temperature zone > zone B (ΔT > 0)
No hot water heating priority instruction]

Heating condition OFF

or [
& [When the water temperature zone = zone A (ΔT = -1)
or [Hot water heating priority instruction
No hot water heating priority instruction]]
& [When the water temperature zone > zone B (ΔT > 0)
Hot water heating priority instruction]
]

ΔT = target - outlet

Remark

Condition ON indicate that H/P will operate in heating mode.

Condition OFF indicate that H/P will not operate in heating mode.

2

2.7 H/P hot water heating operation

The H/P hot water heating thermostat ON / OFF judging is always carried out when hot water mode is ON (active on interface).

Hot water H/P thermostat ON

When ΔT ($\underbrace{T_{HPMAX} - [6.01] - [6.00]}_{T_{HP\ ON}}$ - water temperature tank) $\geq$ 0°C

Hot water H/P thermostat OFF

When ΔT ($\underbrace{T_{HPMAX} - [6.01]}_{T_{HP\ OFF}}$ - water temperature tank) $\leq$ 0°C

Remark H/P will only OPERATE when hot water H/P thermostat ON and has the permission determined by setting [8] (see setting [8.01] & [8.02]).

2.8 H/P hot water heating priority function

The H/P domestic hot water heating priority instruction is determined by the request level between heating / cooling and domestic hot water.

Hot water heating priority instruction active

&

- Request level hot water heating mode higher than heating (cooling) mode
- Balance between DHW and heating request (default): DSW_No4=OFF
- Domestic water tank installed: DSW_No2=ON
- H/P domestic water heating thermostat-ON
- Anti-recycle timer, setting [8.02] not active

Remark

Hot water heating priority instruction is not applicable.

In case of domestic water heating operation mode is not active (not activated on the interface, schedule timer), setting [5.02] applicable or DSW_No4=ON (*).

(*): In case the DSW_No4 is ON, the DHW production will only become active if the system reach an thermostat OFF for cooling or heating.

2.9 Booster heater operation

Booster heater thermostat ON

When the water temperature in tank drops 2°C below “target DHW + setting [7.00]”.

Booster heater operates

- $T_{DHW} \leq T_{HP\ ON}$
  - Delay timer of (20 ~ 95) minutes starts (setting [8.03])
    After this delayed time booster heater operates
- $T_{DHW} \geq T_{HP\ ON}$
  - Delay timer of 20 minutes (fixed) starts
    After this delayed time booster heater operates

Booster heater thermostat OFF (stops operation)

When the water temperature in tank reach “target DHW + setting [7.00]”.

Delay timer is reset.

Remark Booster heater operation prohibition / permission can be determined by schedule timer.

2.10 Backup heater operation

Normal backup heater operation

In order to provide bigger heating capacity by low outdoor temperatures the backup heater can / will provide additional capacity.

Backup heater permission decision

BUH operation permission / prohibition by setting [4.00]

Backup heater priority decision

BUH operation priority by setting [4.01]

BUH operation ON

&

- BUH permissioned to operate ([4.00]=1)
- Ambient temperature ≤ setting [5.01] equilibrium temperature
- Request to operate BUH (determined by capacity demand)
- Delay timer of 6 minutes is over
- Or
  - [4.01] = 1 AND booster heater is NOT operating
  - [4.01] = 0

BUH will stop operation when one of the below conditions are applicable:

BUH operation OFF

or

- BUH permissioned to operate ([4.00]=0)
- NO request to operate BUH (determined by capacity demand)
- Ambient temperature > setting [5.01] + 3°C
- [4.01] = 1 AND booster heater is operating

Remark

The BUH heater will stop immediately by following safety items:

- NO flow signal
- Outlet water temperature after BUH higher than 55°C
- Return water temperature thermistor abnormality
- Thermal protector of BUH is open

Start up control by space heating operation

In order to start up the heat pump in controlled way when low outside air and low water temperature.

Start up operation

BUH operates when:

&

- &
  - Indoor demand operation mode is heating
  - No defrost operation
  - Inlet water temperature lower than 15°C
  - Outside air temperature lower than 22°C
- &
  - Outlet water temperature after BUH lower than 55°C [overheat protection temperature]
  - No return water temperature thermistor abnormality [error code 80 on interface]

This control overrules the settings [4] & [5].

BUH forced OFF when pump OFF.

2

Heat exchanger freeze prevention BUH control

In order to prevent breakage by heat exchanger freeze from defrost (start up) operation when low outside air and low water temperature.

Space heating defrost operation

BUH operates when:

&
- &
  - Indoor demand operation mode is heating
  - Defrost operation
  - Return water temperature below security level
- &
  - Outlet water temperature after BUH lower than 55°C [overheat protection temperature]
  - No return water temperature thermistor abnormality [error code 80 on interface]

This control overrules the settings [4] & [5].

BUH forced OFF when pump OFF.

BUH protection control

In order to prevent breakage by BUH.

The BUH heater will stop immediately by following safety items:

- NO flow signal
- Outlet water temperature after BUH higher than 55°C [overheat protection temperature]
- No return water temperature thermistor abnormality [error code 80 on interface]
- Thermal protector of BUH is open [error code AA on interface]

Remark (during commissioning)

BUH operates for short periods. Due to remaining air in the piping short ‘no flow’ BUH stops and delay timer restarts.

2.11 Emergency operation

Indoor control by emergency.

In order to provide the customer a minimum heating capacity. The unit will go automatically in emergency operation when malfunction occur at the outdoor or indoor unit. This minimum heating capacity will be provide by BUH.

Space heating operation by emergency

BUH operates when:

&

- Heat-pump abnormality
- Indoor demand operation mode is heating
- Request to operate BUH (determined by capacity demand)
- Delay timer of 6 minutes is over

  or

  - [4.01] = 1 AND booster heater is NOT operating
  - [4.01] = 0

This control overrules the settings [4.00] & [5].

BUH forced OFF when pump OFF or no flow.

2

3 Outdoor Unit Functional Concept

3.1 What Is in This Chapter?

Introduction

This chapter will explain more details about the various functions that are programmed for the sky-air R410A inverter outdoor units.

Overview

This chapter contains the following topics:

3.2 Function Outline

Introduction

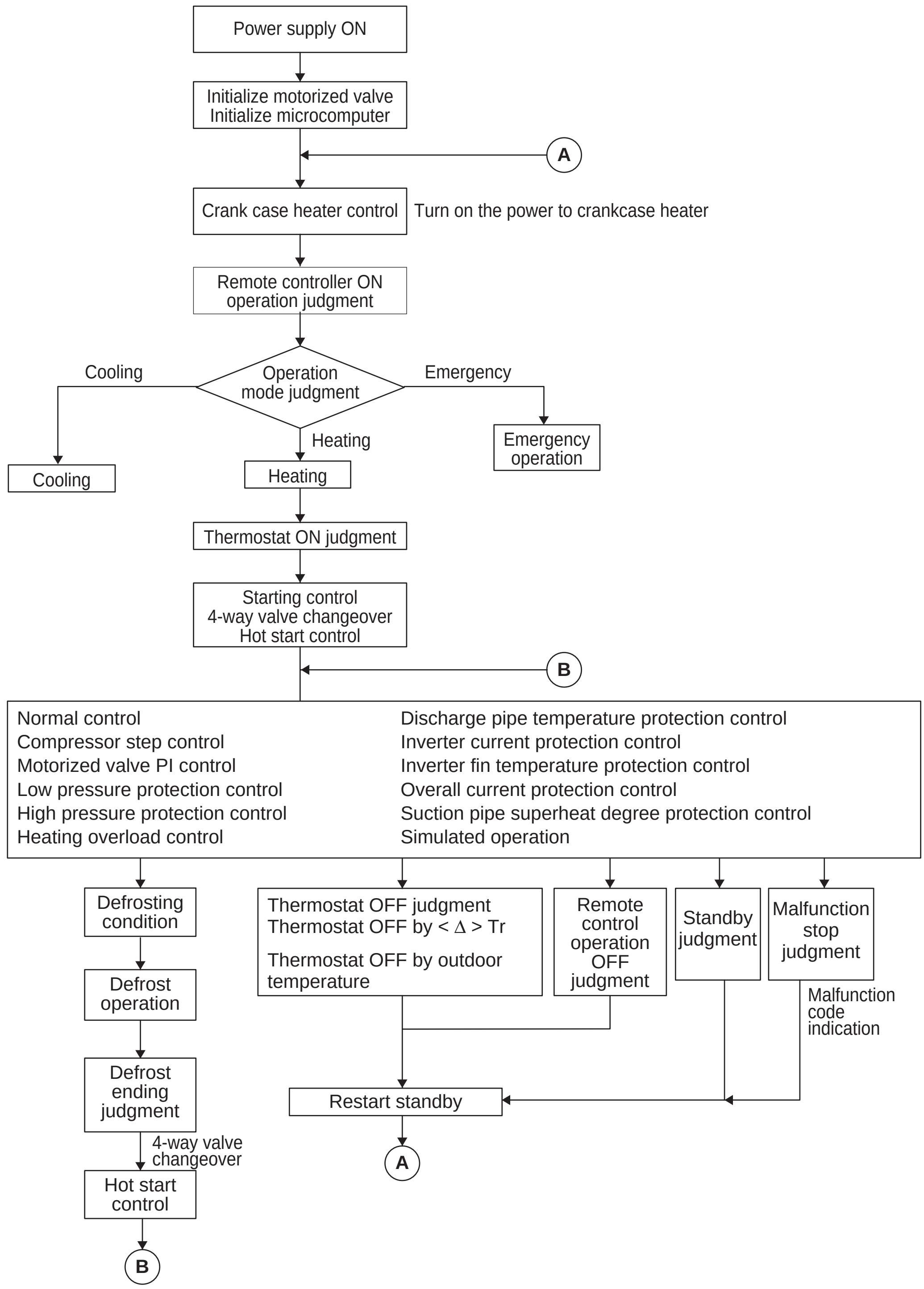
This chapter will show an overview of all applicable functions in cooling and heating mode.

Content

3.2.1 Function Outline in Heating Mode

Flow chart

Heating operation



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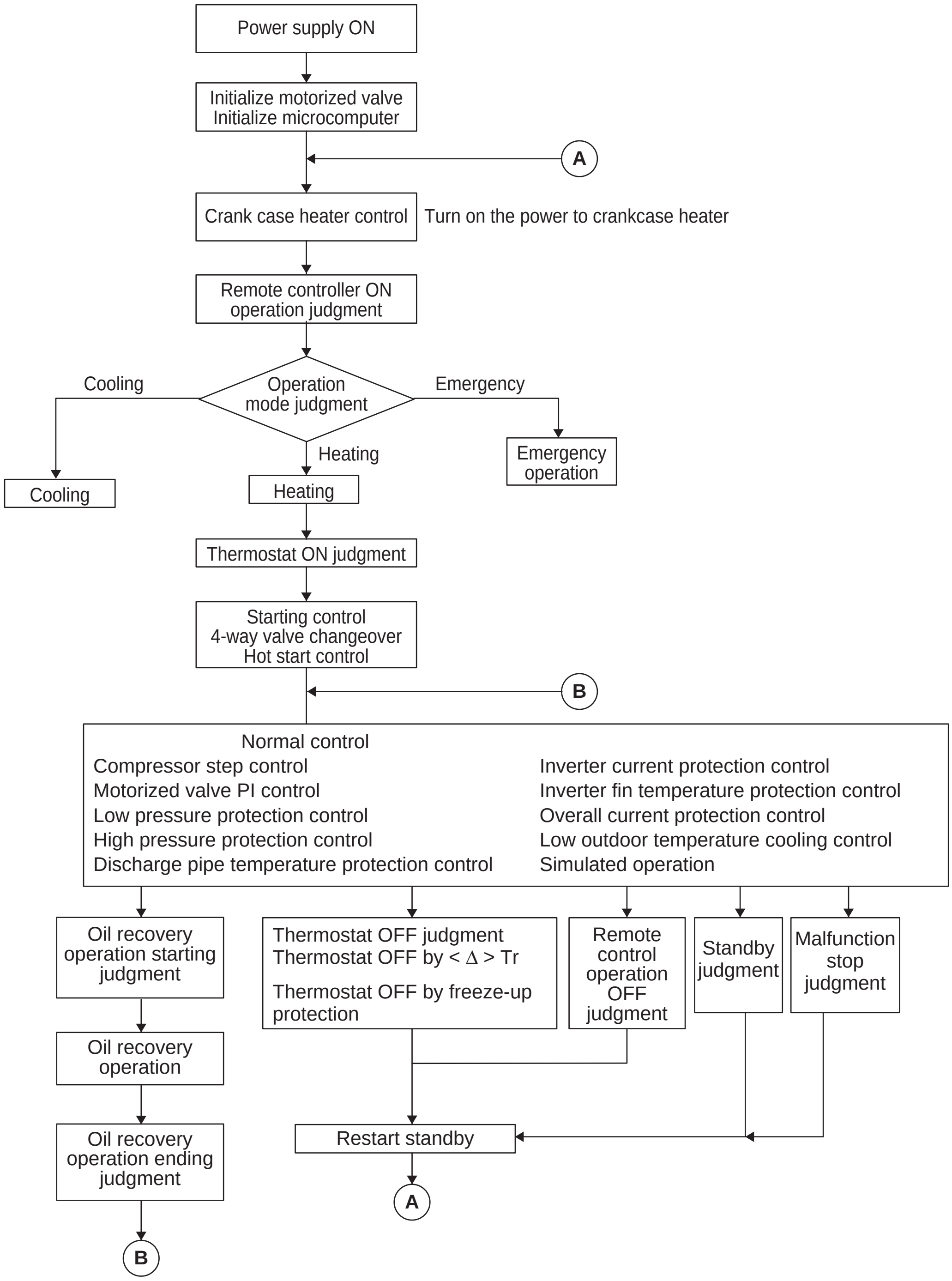
3.2.2 Function Outline in Cooling Mode

Flow chart

Cooling



3.3 Frequency Regulating Functions

Introduction

One of the main functions of the μ-controller will be the control of the compressor frequency. The next chapter will explain how the compressor frequency is determined.

Content

2

3.3.1 Starting Frequency Control

Outline

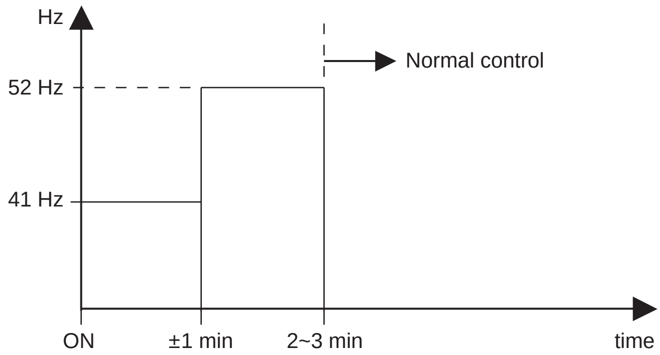
The inverter compressor will start up with a limited fixed frequency value for a specified period of time in order to prevent liquid back to the compressor, and to limit the starting current.

General

The normal starting control time is 2~3 minutes. The maximum starting frequency control time is limited to 10 minutes.

During compressor start-up, a pressure difference will be build up in order to have sufficient pressure difference for the 4-way valve to change over.

Graph



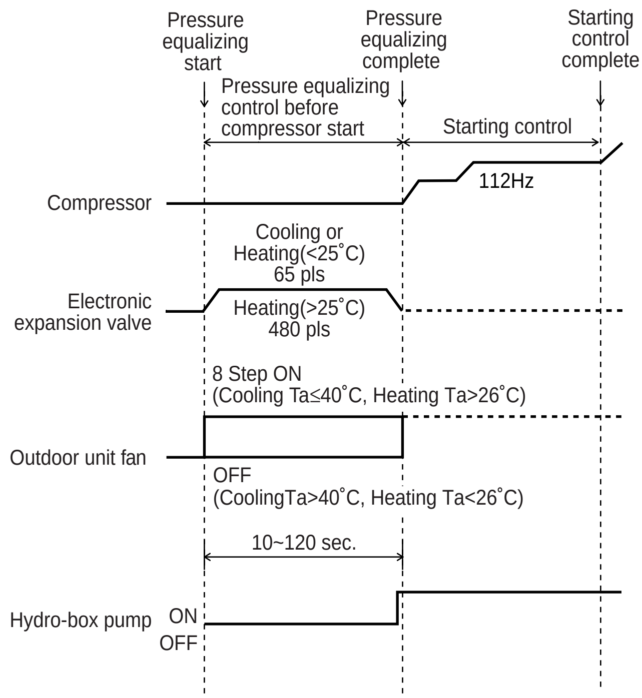
Ending condition

The starting control will be terminated when the low pressure value < 6 bar or when the maximum starting time of 10 minutes has been reached in case the low pressure value stays > 6 bar.

3.3.2 Starting Control

Starting control

When compressor start up, the starting frequency is fixed for specified period of time at low frequency to prevent returning of refrigerant.



3.3.3 General Frequency Control

Outline

After the "Starting frequency control" function has been terminated, the ideal compressor frequency will be determined by the "General frequency control".

General

The compressor operation frequency is controlled in order to keep a constant evaporation temperature in cooling and a constant condensing temperature in heating.

The frequency can be changed every 20 seconds.The maximum frequency change = 2 steps/change. (= max 6 steps/min)

During abnormal situations (e.g. inverter current protection) the change per step is also = 2 steps/change, but the 20 seconds interval may be decreased, so a quicker change is possible.

Note

When other control functions are activated (e.g. discharge pipe control), they can change the compressor frequency using other inputs than the ones normally being used by the "General frequency control" function.

Cooling

In cooling, the target operation frequency will be determined by the indoor Δt and the evaporating temperature.

Δt cool = Remote controller set temperature - Outlet water temperature.

Depending on the cooling load, the target evaporating temperature (Te) will be a value between 2°C $\leq$ Te $\leq$20°C TBC.

Heating

In heating, the target operation frequency will be determined by the indoor Δt and the condensing temperature.

Δt heat = Outlet water temperature - Remote controller set temperature.

Depending on the heating load, the target condensing temperature (Tc) will be a value between 28°C $\leq$Tc $\leq$58°C TBC.

Frequency steps

The operating frequency for the inverter units will be a value chosen from a list with fixed frequency settings that is programmed in the unit's memory:

Step No.	Compressor operation frequency
	ERHQ011~016AAV3
1	32 Hz
2	36 Hz
3	41 Hz
4	44 Hz
5	48 Hz
6	52 Hz
7	57 Hz
8	62 Hz
9	67 Hz
10	72 Hz
11	78 Hz
12	84 Hz
13	90 Hz
14	94 Hz
15	98 Hz
16	102 Hz
17	107 Hz
18	112 Hz
19	117 Hz
20	123 Hz
21	131 Hz
22	139 Hz
23	147 Hz
24	155 Hz
25	164 Hz
26	174 Hz
27	184 Hz
28	194 Hz

Maximum frequency step

	Cooling	Heating
ERHQ011AAV3	20	17
ERHQ014AAV3	26	22
ERHQ016AAV3	28	24

2

3.3.4 Low Pressure Protection Control

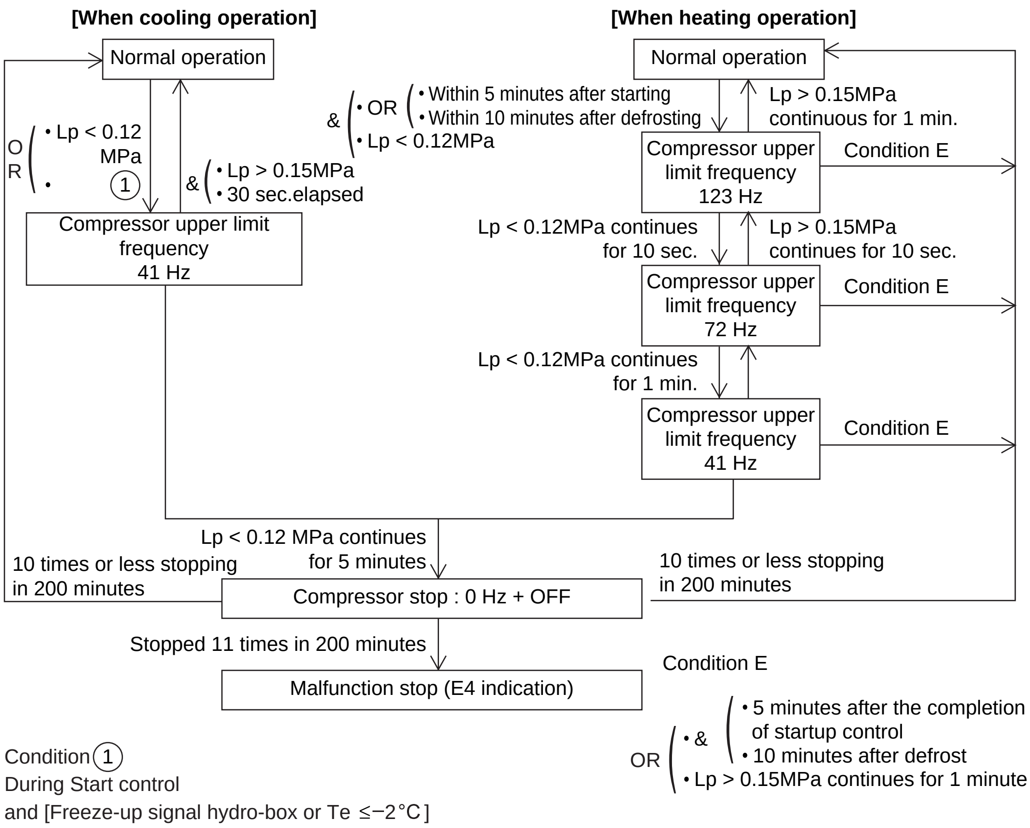
Outline

In order to prevent low pressures in the system, the below control function will be activated.

Details

Low pressure is a calculated value during heating operation. Low pressure is detected by the pressure sensor during cooling operation.

Flow chart



3.3.5 High Pressure Protection Control

Outline

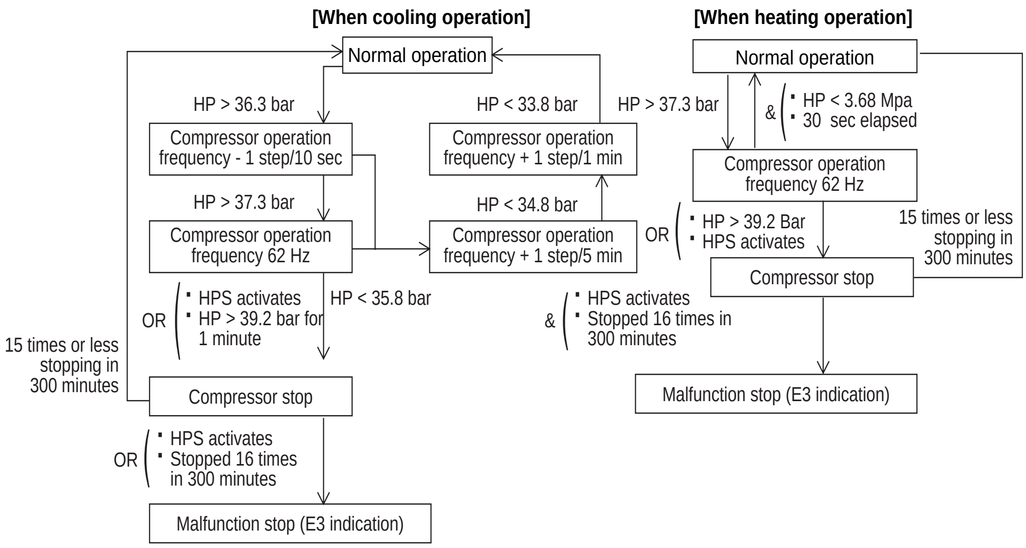
In order to prevent abnormal high pressures in the system and hence avoiding activation of the high pressure safety device the below control function will be activated.

Details

The high pressure value will be calculated from the low pressure, power input and compressor frequency. Low pressure is a calculated value during cooling operation. The high pressure value is detected by the pressure sensor.

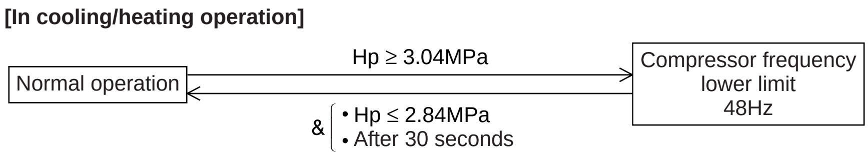
- HPS opens at : 40 bar (tolerance: +0 / -0.15)
- HPS closes at : 30 bar (tolerance : +/- 0.15)

Flow chart



Minimum frequency

As the bearing resistance limit pressure decreases during low frequency of the compressor, the lower limit of frequency is restricted.



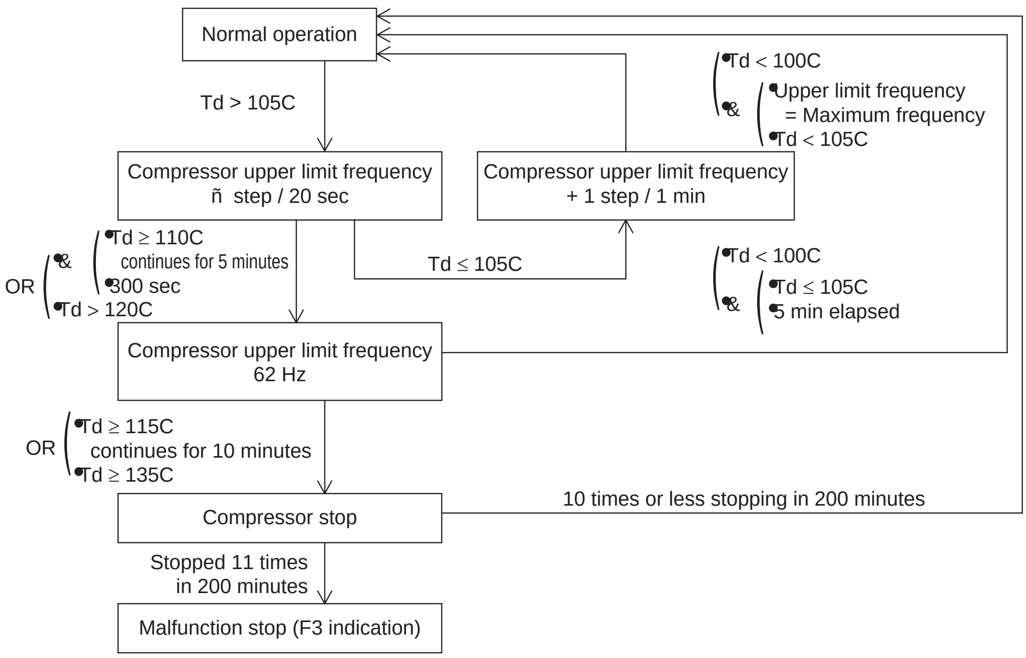
2

3.3.6 Discharge Pipe Temperature Control

Outline

The compressor operating frequency will be controlled in order to avoid abnormal high compressor temperatures (see also expansion valve control).

Flow chart

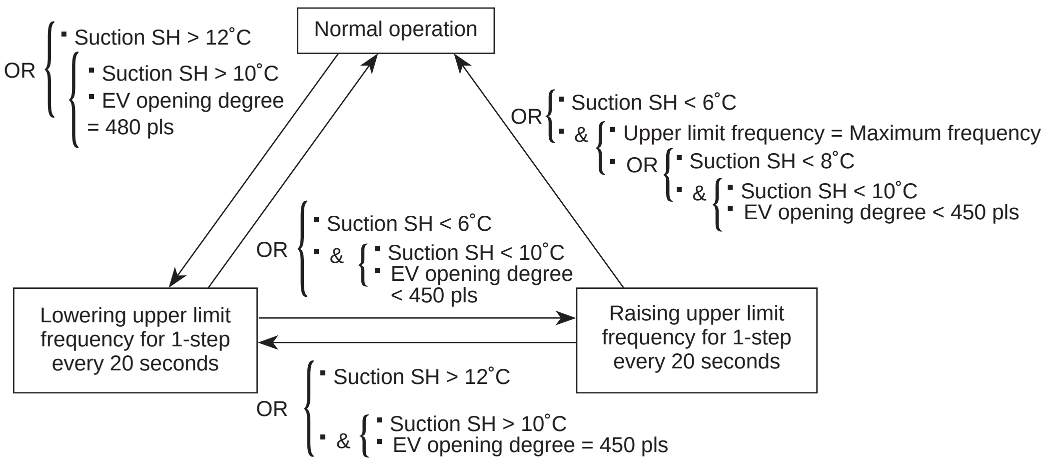


3.3.7 Suction Pipe Superheat Protection Control (Heating Mode)

Outline

In case the suction superheat value in heating mode is too high, the oil return to the compressor will be insufficient. In order to avoid that the compressor oil will be accumulated in the outdoor unit heat exchanger, the upper limit frequency will be decreased.

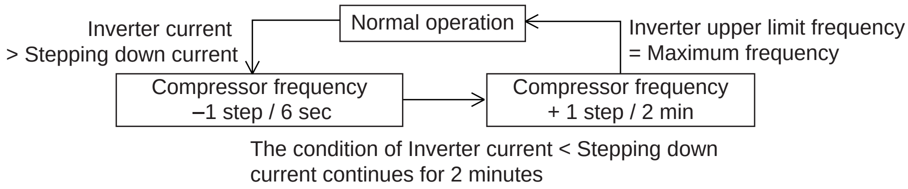
Flow chart

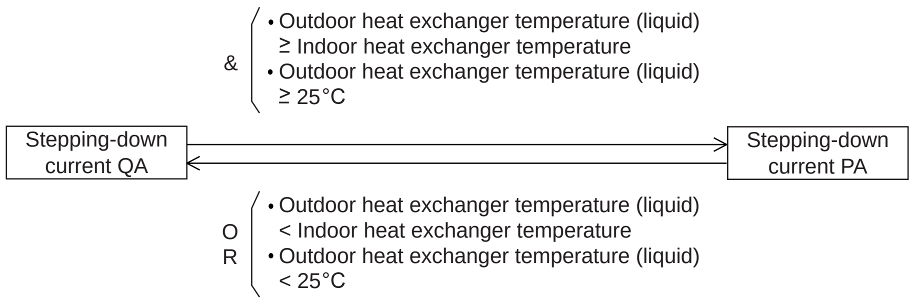


3.3.8 Inverter Current Protection Control

Flow chart

Restricts compressor operation frequency to prevent compressor from tripping due to inverter overcurrent.



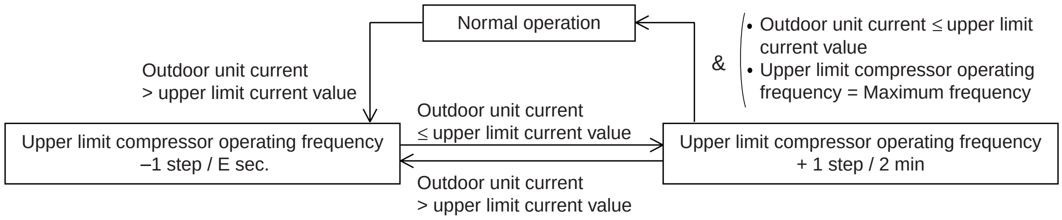


	ERHQ V3	**ERHQ W1**
PA	20A	9.5A
QA	20A	11.5A

3.3.9 Protection Control by Overall Current

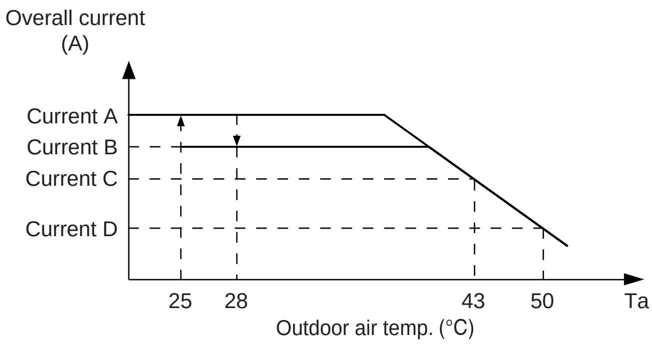
Flow chart

Monitors the overall current and restricts the upper limit compressor operating frequency to prevent circuit breakers from exceeding the rated capacity.



Upper limit current (A)

Takes the following values depending on the outside temperature.
Also varies depending on model.



	ERHQ V3	ERHQ W1
A	24.0A	13.5A
B	24.0A	11.2A
C	23.0A	11.2A
D	16.0A	11.2A
E	10 (sec.)	6 sec.

2

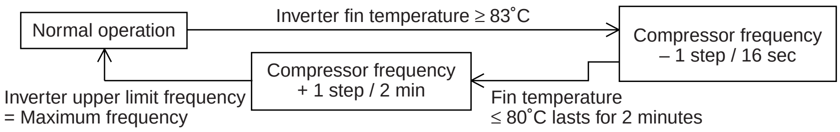
3.3.10 Inverter Cooling Fin Temperature Control

Outline

This control will restrict the compressor upper limit frequency in order to protect the electronic components in the switch box from overheating (L4-error activation).

By lowering the compressor frequency, the current drawn by the compressor will be reduced and as a result the temperature inside the switch box will drop.

Flow chart



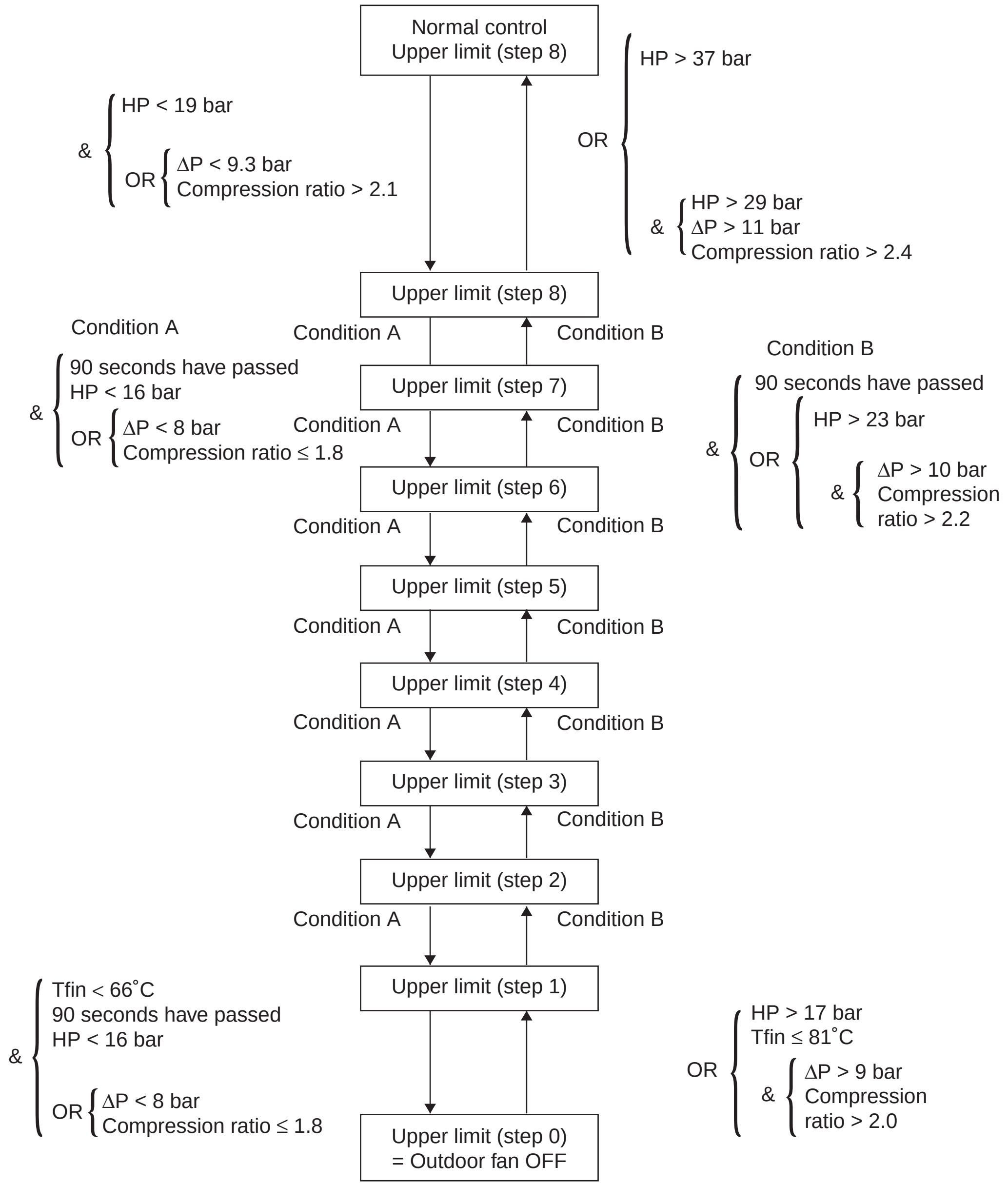
3.3.11 Pressure Difference Control

Outline

To ensure the compression ratio (pressure difference between high and low pressure) at low outdoor temperature conditions in cooling mode and high outdoor temperature conditions in heating mode, the outdoor fan and target compressor frequency may be varied.

Cooling

In cooling low ambient conditions, the outdoor fan speed and compressor frequency will be adapted to secure the differential pressure between high and low pressure.



Frequency restriction in cooling

	Normal control		
Upper limit frecuency	011	014	016
	123 Hz	174 Hz	174 Hz
Lower limit frecuency	41 Hz		

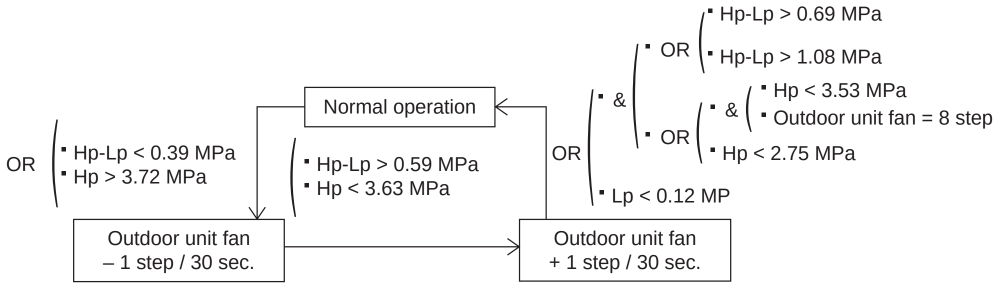
Ta ≤ 20˚C ↓ ↑ Ta ≥ 21˚C

	011	014 / 016
Upper limit frequency	123 Hz	139 Hz
Lower limit frequency	72 Hz	72 Hz

Heating

High outdoor ambient (overload conditions):

In heating overload conditions, the outdoor fan speed will be adapted to secure the differential pressure between high and low pressure.



Only the fan speed will be adapted in heating overload conditions.

No adjustments to the compressor frequency will be made.

3.3.12 Oil Recovery Operation

Outline

When the compressor operates for a certain period of time at low frequency, the oil level in the compressor may become low due to incomplete oil return. To prevent damage to the compressor and in worst case avoid compressor lock, an oil recovery operation will be conducted.

Details

During the oil recovery operation, the operation frequency of the compressor will be increased for a time period of 5 minutes.Oil recovery operation is only executed in cooling mode.In heating mode, oil return to the compressor is guaranteed by the defrost operation.

3.4 Expansion Valve Regulating Functions

Introduction

This chapter will explain the functions that are used to control the expansion valve opening.

Content

3.4.1 Expansion Valve Control at Startup

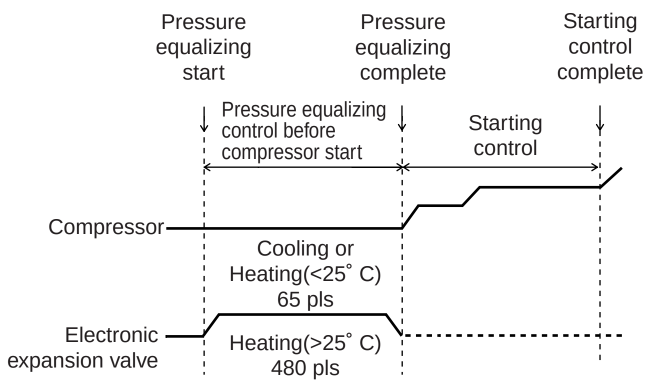
Outline

Before going to the general expansion valve control, the expansion valve opening will be limited in order to avoid the risk of liquid back and allow quick build up of pressure difference.

Details

During startup, the opening degree is determined by both the compressor frequency & the suction superheat. During startup, it is not possible to use only the value of the suction superheat because the operation is not stable yet. As a consequence also the SH value will not be stable.

Graph



Ending condition

The starting control will be terminated when the low pressure value < 6 bar or when the maximum starting time of 10 minutes has been reached in case the low pressure value stays > 6 bar.

3.4.2 General Expansion Valve Control

Outline

After the start up control function has been terminated the general expansion valve control function will regulate the expansion valve opening in function of the target suction SH value.

The discharge SH value will be used to set the target SH value.

The measured suction SH value will be used to control the opening of the expansion to the target SH value.

Details

When the unit is in cooling or heating operation the opening of the expansion valve will be controlled in order to keep the amount of superheat at the evaporator outlet constant. This way the evaporator can be used at maximum efficiency under all conditions. The initial target heat exchanger outlet superheat value = 5°C.

The target heat exchanger outlet superheat value can be increased in case the discharge superheat value decreases.

The target heat exchanger outlet superheat value can be decreased in case the discharge superheat value increases.

Control

During normal control 2 situations can decide on the expansion valve opening degree:

1 Target superheat amount:
- When the target heat exchanger outlet superheat > actual heat exchanger outlet superheat --> the expansion valve will close.
- When the target heat exchanger outlet superheat < actual heat exchanger outlet superheat --> the expansion valve will open.

The superheat amount is checked every 10 seconds.

2 Frequency change: At the time of compressor frequency change, the expansion valve opening will be changed with a fixed value. This value will be in function of the amount of compressor frequency change.

Calculations

The heat exchanger outlet superheat value is calculated from the saturated suction temperature Te(using indoor coil sensor in cooling, outdoor coil sensor in heating) and the suction pipe temperature R4T : SH = R4T-Te

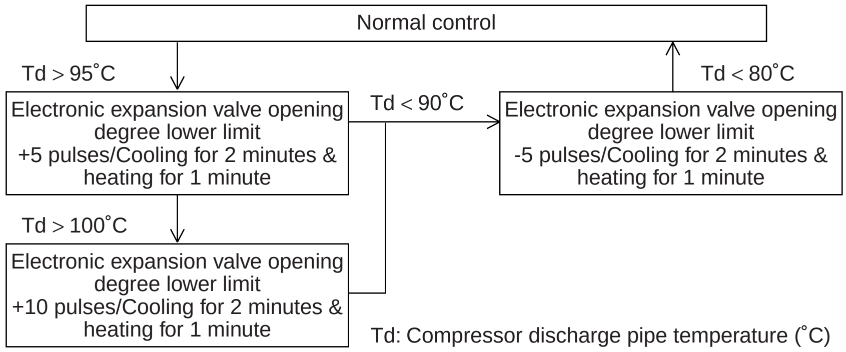
The discharge superheat value is calculated from the saturated discharge temperature Td (HP value calculated out of PI, frequency and Te) or Tc and the discharge pipe temperature R3T : SH = R3T-Td or R3T or SH = R3T-Tc (whichever is the lowest)

3.4.3 Discharge Pipe Temperature Protection Control

Outline

The expansion valve opening will be controlled in order to avoid abnormal high compressor discharge temperatures (see also compressor operating frequency control).

Details



3.5 Outdoor Unit Fan Speed Control

Introduction

This chapter will explain how the outdoor fan speed is determined in cooling and heating operation.

Content

3.5.1 Outdoor Unit Fan Speed Control

Fan speed control

The outdoor fan speed will be controlled in function of the actual outdoor ambient temperature, the condensation pressure, pressure difference between low and high pressure and compression ratio.

For details please refer to "Pressure Difference Control".

2

Fan step table

	Cooling		Heating	
Step	**M1F**	**M2F**	**M1F**	**M2F**
0	0 rpm	0 rpm	0 rpm	0 rpm
1	250 rpm	0 rpm	250 rpm	0 rpm
2	400 rpm	0 rpm	285 rpm	250 rpm
3	285 rpm	250 rpm	335 rpm	300 rpm
4	360 rpm	325 rpm	395 rpm	360 rpm
5	445 rpm	410 rpm	470 rpm	435 rpm
6	545 rpm	510 rpm	560 rpm	525 rpm
7	660 rpm	625 rpm	660 rpm	625 rpm
8	850 rpm	815 rpm	842 rpm	807 rpm

Part 3
Troubleshooting

What is in this part?

This part contains the following chapters:

3

1 Troubleshooting

1.1 What Is in This Chapter?

3

Introduction

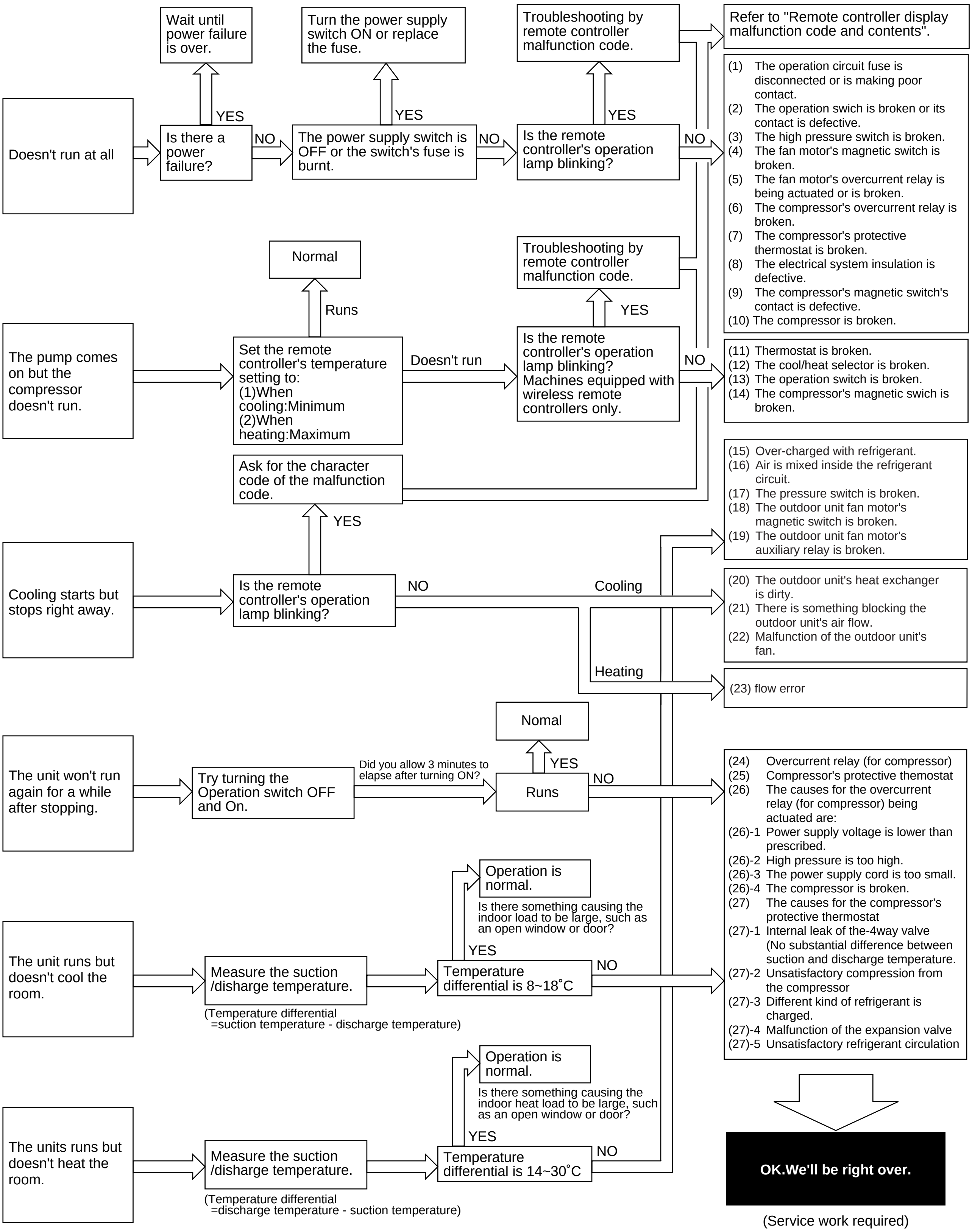
When a problem occurs, you have to check all possible malfunctions. This chapter gives a general idea of where to look for malfunctions.

Not all repair procedures are described. Some procedures are considered common practice.

Overview

This chapter contains the following topics:

1.2 General Troubleshooting Flowchart



1.3 Overview of General Problems

General guidelines

Before starting the troubleshooting procedure, carry out a thorough visual inspection of the unit and look for obvious defects such as loose connections or defective wiring.

Before contacting your local Daikin dealer, read this chapter carefully, it will save you time and money.

Warning! When carrying out an inspection on the switch box of the unit, always make sure that the main switch of the unit is switched off.

When a safety device was activated, stop the unit and find out why the safety device was activated before resetting it. Under no circumstances safety devices may be bridged or changed to a value other than the factory setting. If the cause of the problem cannot be found, call your local Daikin dealer.

If the pressure relief valve is not working correctly and is to be replaced, always reconnect the flexible hose attachted to the pressure relief valve, to avoid water dripping out of the unit!

General symptoms

	Equipment Condition	Remedy
1.3.1	Equipment does not Operate	See page 3-7
1.3.2	Indoor Pump Operates, but Compressor does not	See page 3-8
1.3.3	Cooling/Heating Operation Starts but Stops Immediately	See page 3-10
1.3.4	After Unit Shuts Down, It cannot be Restarted for a While	See page 3-12
1.3.5	Equipment Produces Loud Noise or Shakes	See page 3-14
1.3.6	Remote Controller LCD Displays “88”	See page 3-16
1.3.7	The Unit is Turned on (y LED is lit) but the Unit is not Heating or Cooling as Expected	See page 3-17
1.3.8	The Unit is Turned on but the Compressor is not Starting (Space Heating or Domestic Heating)	See page 3-18
1.3.9	Pump is Making Noise (Cavitation)	See page 3-19
1.3.10	The Water Pressure Relief Valve Opens	See page 3-20
1.3.11	The Water Pressure Relief Valve Leaks	See page 3-21
1.3.12	The User Interface Displays "n" when Pressing Certain Buttons	See page 3-22
1.3.13	Space Heating Capacity Shortage at Low Outdoor Temperatures	See page 3-23

Error codes

When a safety device is activated, the user interface LED will be flashing, and an error code will be displayed.

A list of all errors and corrective actions can be found in the table below.

Reset the safety by turning the unit OFF and back ON.

Instruction to turn the unit OFF			
User interface mode (heating/cooling ☀/❄)	**Domestic hot water mode ( )**	**Push the button**	**Push the ⏻ button**
ON	ON	1 time	1 time
ON	OFF	1 time	—
OFF	ON	—	1 time
OFF	OFF	—	—

3

1.3.1 Equipment does not Operate

Applicable model

ERHQ011~016AA

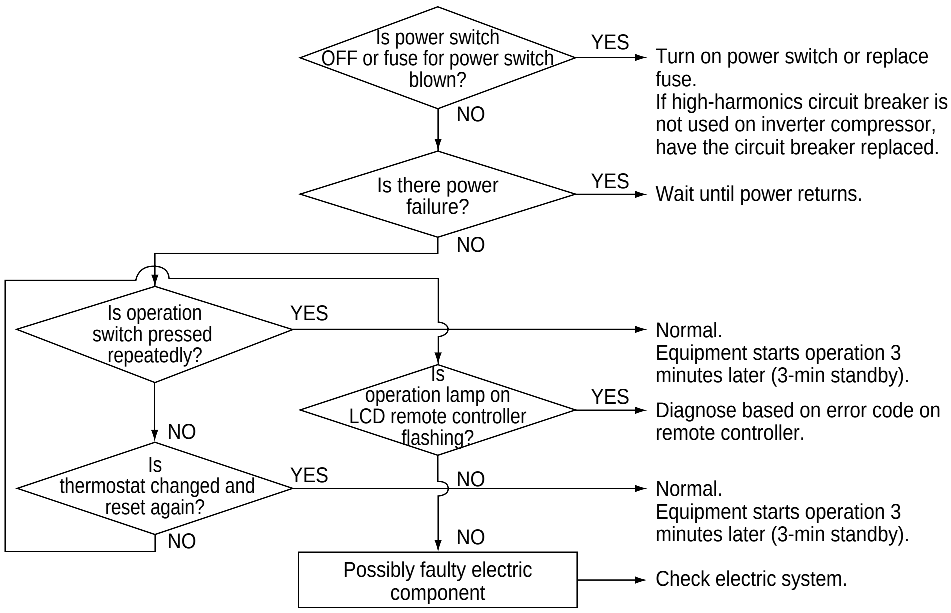
Error detection method

Error generating condition

Supposed causes

- Fuse blown or disorder of contact in operation circuit
- Faulty operation switch or contact point
- Faulty high pressure switch
- Faulty magnetic switch for fan motor
- Activation or fault of overcurrent relay for fan motor
- Faulty overcurrent relay for compressor
- Faulty compressor protection thermostat
- Insufficient insulation in electric system
- Faulty contact point of magnetic switch for compressor
- Malfunction of compressor
- Fefective remote controller

Troubleshooting



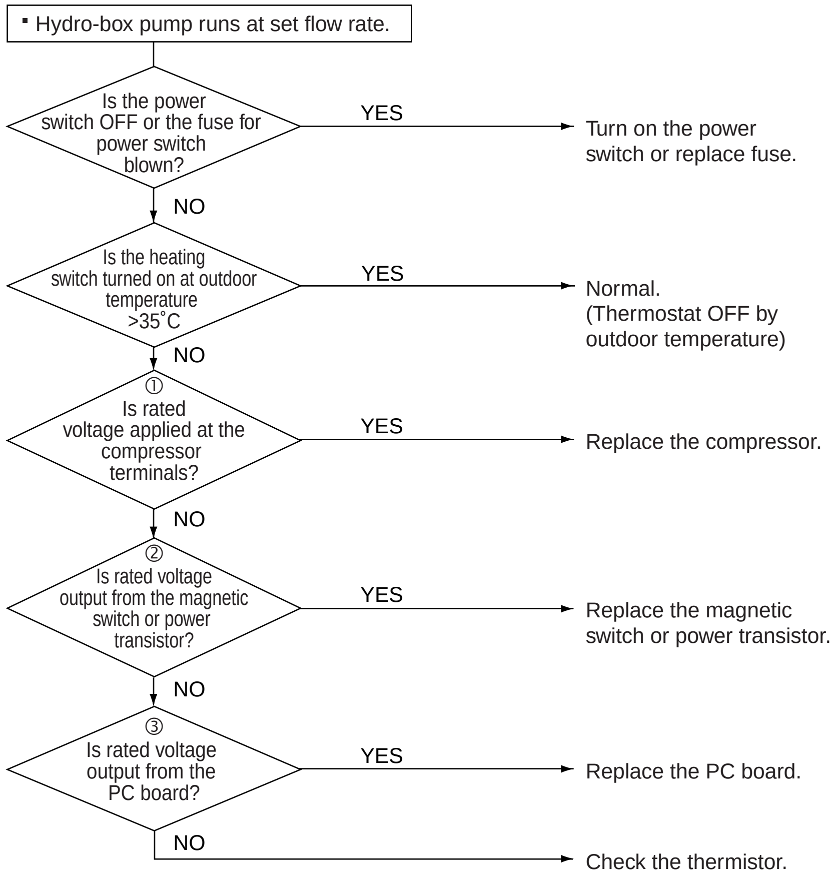
Caution

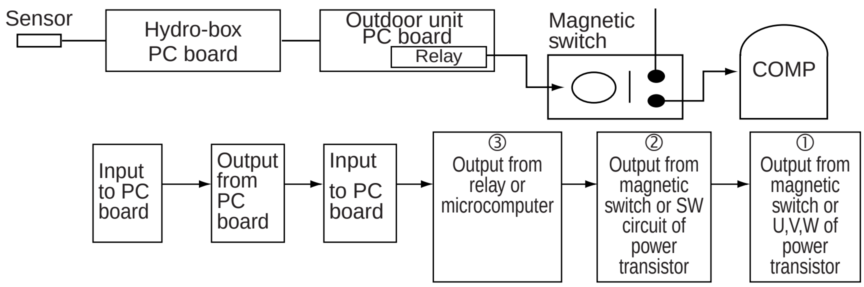
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

1.3.2 Indoor Pump Operates, but Compressor does not

Applicable model	ERHQ011~016AA
Error detection method	
Error generating condition	
Supposed causes	■ Faulty thermistor ■ Faulty indoor/outdoor unit PC board ■ Faulty magnetic switch ■ Faulty power transistor ■ Faulty compressor

Troubleshooting





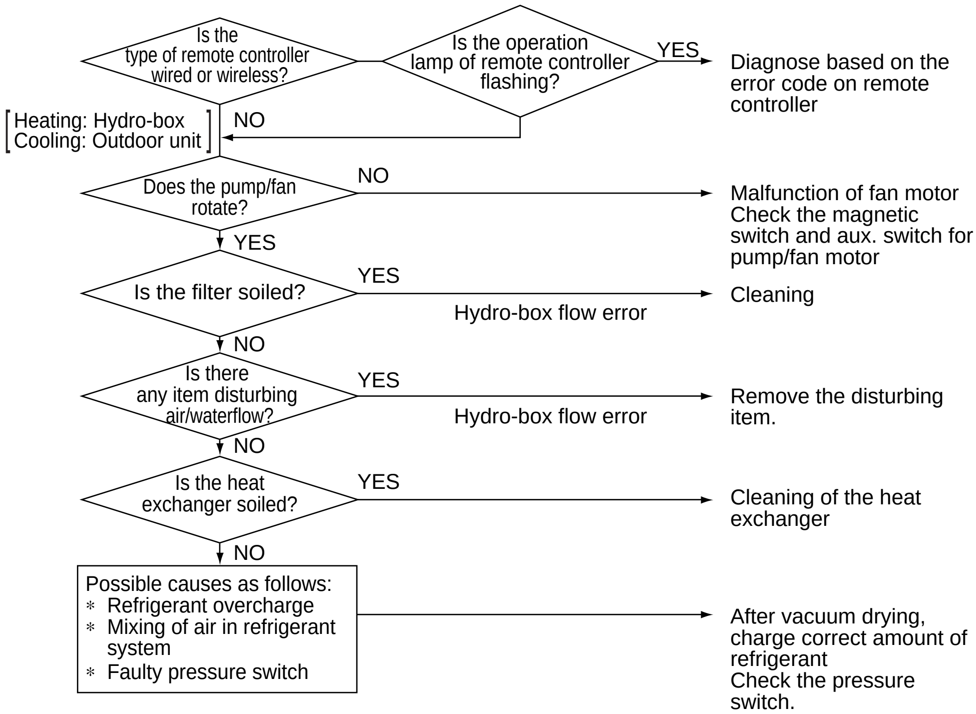
Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

1.3.3 Cooling/Heating Operation Starts but Stops Immediately

Applicable model	ERHQ011~016AA
Error detection method	
Error generating condition	
Supposed causes	■ Excess charge of refrigerant ■ Air intrudes into refrigerant system ■ Faulty pressure switch ■ Faulty magnetic switch for outdoor unit fan motor ■ Faulty aux. relay for outdoor unit fan motor ■ Soiled heat exchanger of outdoor unit ■ There is an interfering item in air flow of outdoor unit ■ Malfunction of outdoor unit fan ■ Soiled air filter of hydro-box ■ Malfunction of hydro-box pump (flow error)

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

1.3.4 After Unit Shuts Down, It cannot be Restarted for a While

Applicable model ERHQ011~016AA

Error detection method

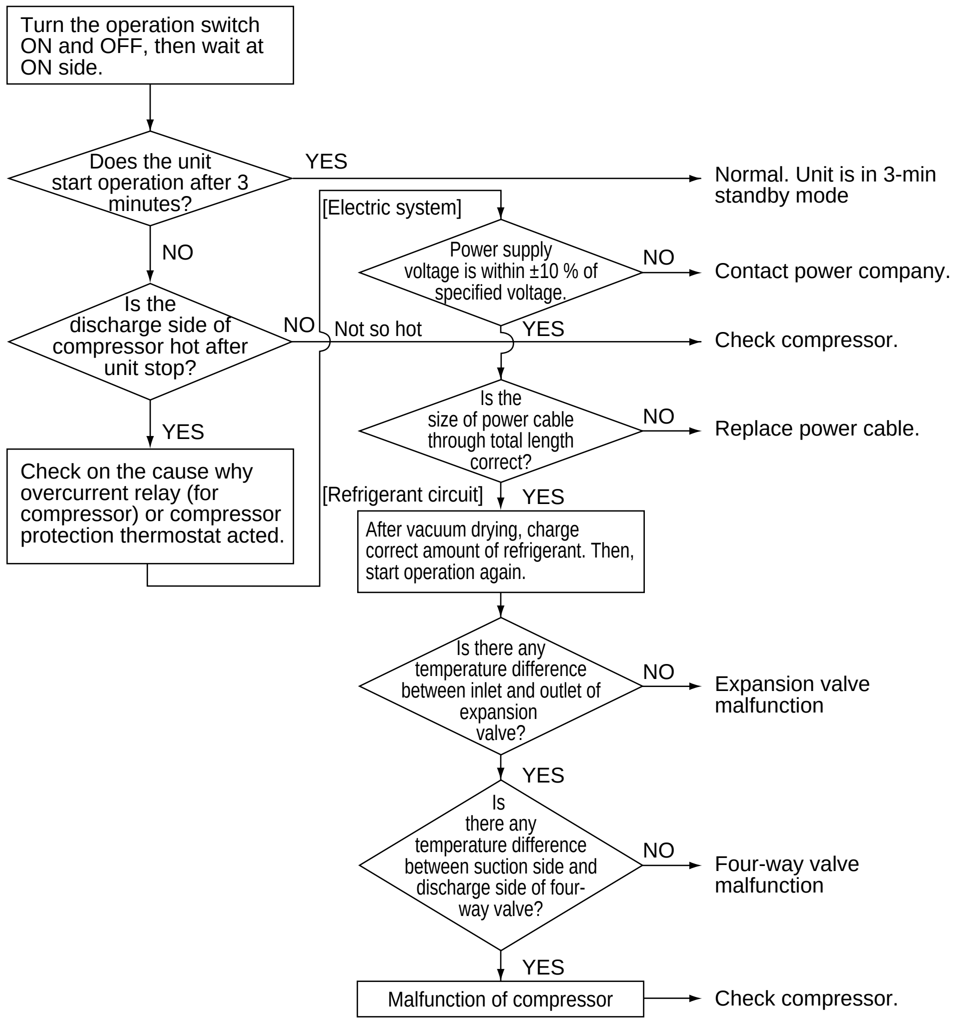
Error generating condition

3

Supposed causes

- Overcurrent relay (for compressor)
- Compressor protection thermostat
- Overcurrent relay may act due to the following reasons:
  - Lower voltage of power supply
  - Excess level of high pressure
  - Insufficient size of power cable
  - Malfunction of compressor
- Compressor protection thermostat may act due to the following reasons:
  - Internal leakage of four-way valve (There is no difference between suction and discharge temperature)
  - Insufficient compression of compressor
  - Incorrect refrigerant
  - Faulty expansion valve
  - Insufficient circulation of refrigerant

Troubleshooting



Caution

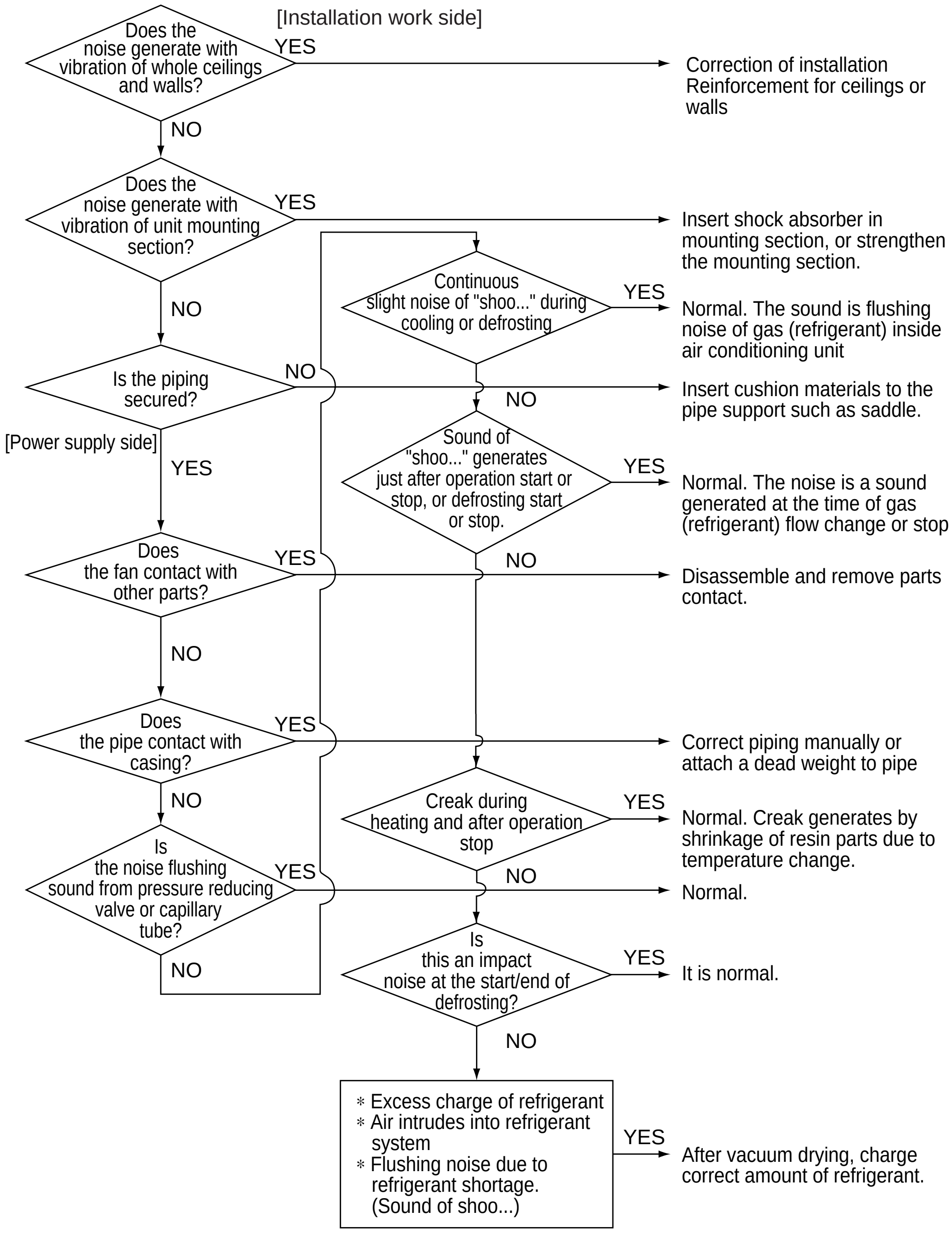
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

1.3.5 Equipment Produces Loud Noise or Shakes

Applicable model	ERHQ011~016AA
Error detection method	
Error generating condition	
Supposed causes	■ Faulty installation ■ Excess charge of refrigerant ■ Air intrudes into refrigerant system ■ Flushing noise due to refrigerant shortage. (Sound of shoo...)

3

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

1.3.6 Remote Controller LCD Displays “88”

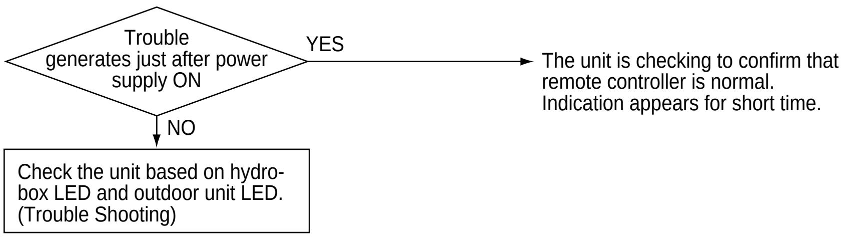
Applicable model ERHQ011~016AA

Error detection method

Error generating condition

Supposed causes

Troubleshooting



Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

1.3.7 The Unit is Turned on (LED is lit) but the Unit is not Heating or Cooling as Expected

Applicable models

EKSWW(U)150~300V3/Z2, EKHWS(U)150~300V3, EKHWS200~300Z2, EKHWE150~300V3, EKHWE200~300Z2, EKHB*016A*, ERHQ011~016AA**

Error detection method

Error generating condition

Supposed causes - corrective action

Possible causes	Corrective action
The temperature setting is not correct.	Check the controller set point.
The water flow is too low.	■ Check that all shut off valves of the water circuit are completely open. ■ Check if the water filter needs cleaning. ■ Make sure there is no air in the system (purge air). ■ Check on the manometer that there is sufficient water pressure. The water pressure must be >0.3 bar (water is cold), >>0.3 bar (water is hot). ■ Check that the pump speed setting is on the highest speed. ■ Make sure that the expansion vessel is not broken. ■ Check that the resistance in the water circuit is not too high for the pump (refer to "Setting the pump speed" on page 19).
The water volume in the installation is too low.	Make sure that the water volume in the installation is above the minimum required value (refer to the "Specifications" chapter in part 1).

1.3.8 The Unit is Turned on but the Compressor is not Starting (Space Heating or Domestic Heating)

Applicable models

EKSWW(U)150~300V3/Z2, EKHWS(U)150~300V3, EKHWS200~300Z2, EKHWE150~300V3, EKHWE200~300Z2, EKHB*016A*, ERHQ011~016AA**

Error detection method

Error generating condition

Supposed causes - corrective action

Possible causes	Corrective action
The unit must start up out of its operation range (the water temperature is too low).	In case of low water temperature, the system utilizes the backup heater to reach the minimum water temperature first (15°C). ■ Check that the backup heater power supply is correct. ■ Check that the backup heater thermal fuse is closed. ■ Check that the thermal protector backup heater is not activated. ■ Check that the backup heater contactors are not broken.

1.3.9 Pump is Making Noise (Cavitation)

Applicable models

EKSWW(U)150~300V3/Z2, EKHWS(U)150~300V3, EKHWS200~300Z2, EKHWE150~300V3, EKHWE200~300Z2, EKHB*016A*, ERHQ011~016AA**

Error detection method

Error generating condition

Supposed causes - corrective action

Possible causes	Corrective action
There is air in the system.	Purge air.
Water pressure at pump inlet is too low.	■ Check on the manometer that there is sufficient water pressure. The water pressure must be >0.3 bar (water is cold), >>0.3 bar (water is hot). ■ Check that the manometer is not broken. ■ Check that the expansion vessel is not broken. ■ Check that the setting of the pre-pressure of the expansion vessel is correct (refer to the "Specifications" chapter in part 1).

3

1.3.10 The Water Pressure Relief Valve Opens

Applicable models

EKSWW(U)150~300V3/Z2, EKHWS(U)150~300V3, EKHWS200~300Z2, EKHWE150~300V3, EKHWE200~300Z2, EKHB*016A*, ERHQ011~016AA**

Error detection method

Error generating condition

3

Supposed causes - corrective action

Possible causes	Corrective action
The expansion vessel is broken.	Replace the expansion vessel.
The water volume in the installation is too high.	Make sure that the water volume in the installation is under the maximum allowed value (refer to the "Specifications" chapter in part 1.)

1.3.11 The Water Pressure Relief Valve Leaks

Applicable models

EKSWW(U)150~300V3/Z2, EKHWS(U)150~300V3, EKHWS200~300Z2, EKHWE150~300V3, EKHWE200~300Z2, EKHB*016A*, ERHQ011~016AA**

Error detection method

Error generating condition

Supposed causes - corrective action

Possible causes	Corrective action
Dirt is blocking the water pressure relief valve outlet.	Check for correct operation of the pressure relief valve by turning the red knob on the valve counter clockwise: ■ If you do not hear a clacking sound, contact your local Daikin dealer. ■ In case the water keeps running out of the unit, close both the water inlet and outlet shut-off valves first and then contact your local Daikin dealer.

3

1.3.12 The User Interface Displays "NOT AVAILABLE" when Pressing Certain Buttons

Applicable models

EKSWW(U)150~300V3/Z2, EKHWS(U)150~300V3, EKHWS200~300Z2, EKHWE150~300V3, EKHWE200~300Z2, EKHB*016A*, ERHQ011~016AA**

Error detection method

Error generating condition

Supposed causes - corrective action

Possible causes	Corrective action
The current permission level is set to a level that prevents using the pressed button.	Change the "user permission level" field setting ([0-00], see page 4-18.

1.3.13 Space Heating Capacity Shortage at Low Outdoor Temperatures

Applicable models

EKSWW(U)150~300V3/Z2, EKHWS(U)150~300V3, EKHWS200~300Z2, EKHWE150~300V3, EKHWE200~300Z2, EKHB*016A*, ERHQ011~016AA**

Error detection method

Error generating condition

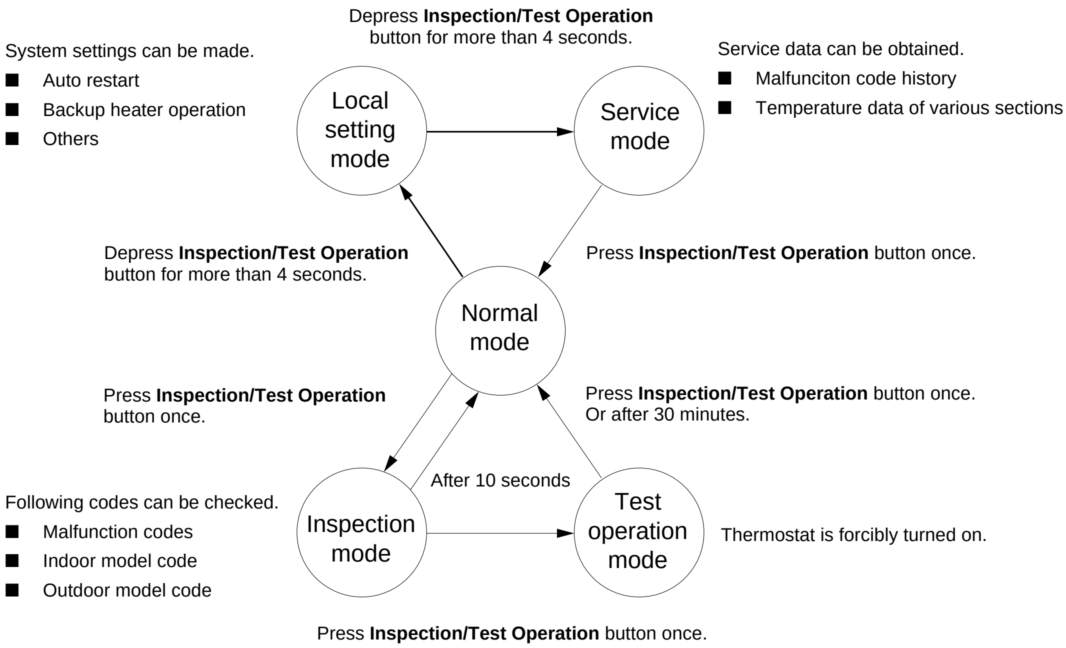
Supposed causes - corrective action

Possible causes	Corrective action
Backup heater operation is not activated.	■ Check that the "backup heater operation status" field setting [4-00] is turned on, see "Field settings" on page 4-21. ■ Check whether or not the thermal protector of the backup heater has been activated (refer to Main components, "Thermal protector backup heater" on page 6 for location of the reset button). ■ Check whether booster heater and backup heater are configured to operate simulaneously (field setting [4-02], see "Field settings" on page 4-21) ■ Check whether or not the thermal fuse of the backup heater is blown (refer to Main components, "Thermal fuse" on page 6 for location of the reset button).
The backup heater equilibrium temperature has not been configured correctly.	Raise the "equilibrium temperature" field setting [5-01] to activate backup heater operation at a higher outdoor temperature.
Too much heat pump capacity is used for domestic water heating (applies only to installa-tions with a domestic hot water tank).	■ Check that the "space heating priority temperature" field settings are configured appropriately: ■ Make sure that the "space heating priority status" field setting [5-02] is enabled. ■ Raise the "space heating priority temperature" field setting [5-03] to activate booster heater operation at a higher outdoor temperature.

1.4 Procedure of Self-Diagnosis by Remote Controller

The inspection/test button

The following modes can be selected by using the [Inspection/Test Operation] button on the remote control.



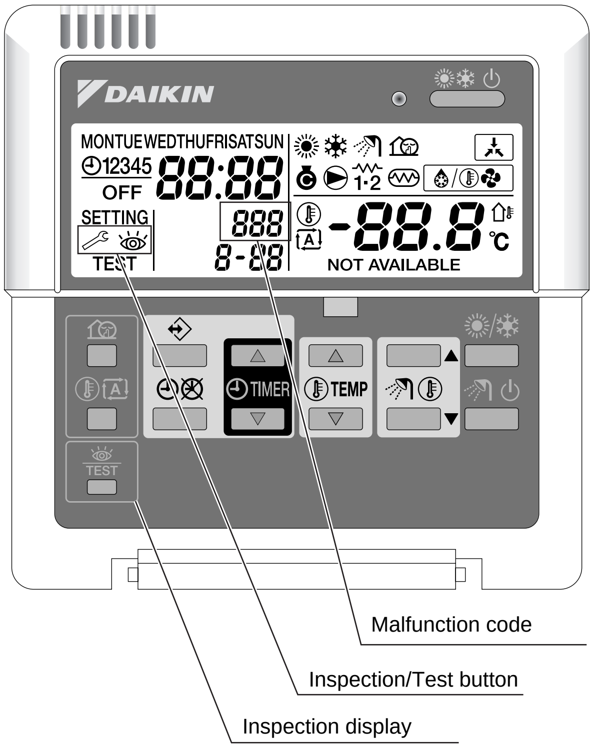
Remark

Above information is general. Not all settings are applicable for ALTHERMA.

1.5 Fault-diagnosis by Remote Controller

Explanation

If operation stops due to malfunction, the remote controller's operation LED blinks, and malfunction code is displayed. (Even if stop operation is carried out, malfunction contents are displayed when inspection mode is entered.) The malfunction code enables you to tell what kind of malfunction caused operation to stop. See page 3-34 for malfunction code and malfunction contents.



1.6 Fault-diagnosis manual reset in the memory

Explanation

In order to reset the malfunction code in the remote controller memory, follow actions has to be performed.

Remark

For some malfunction codes it’s required to manual reset the malfunction code in the memory before the unit can be restart.

See instruction on page 3-34.

1.6.1 Remote Controller Display Malfunction Code and Contents

	Malfunction code	Contents/Processing	Remarks
Hydro-box	80	Inlet water temperature thermistor abnormality	
	81	Outlet water temperature thermistor abnormality	
	89	Water heat exchanger freez-up abnormality	
	7H	Flow abnormality	
	8H	Outlet water temperature too high	
	AA	Booster or back-up heater thermal protector is open	
	A1	Hydro-box PCB abnormality	
	C0	Flow switch abnormality	
	C4	Heat exchanger thermistor abnormality	
	EC	Domestic hot water temperature too high	
	HC	Domestic hot water temperature thermistor abnormality	
Outdoor Unit	E1	Outdoor unit PC board malfunction	
	E3	High pressure malfunction (outdoor unit)	
	E4	Abnormality of low pressure (outdoor)	Failure of low pressure sensor system. Check if the stop valve is open.
	E5	Compressor motor lock malfunction	Compressor motor lock, incorrect wiring.
	E7	Outdoor fan motor lock or outdoor fan instantaneous overcurrent malfunction	
	E9	Malfunction of electronic expansion valve (outdoor unit)	
	F3	Discharge pipe temperature malfunction (outdoor unit)	
	H3	Failure of high pressure switch (outdoor unit)	
	H9	Malfunction of outdoor air temperature sensor system (outdoor unit)	
	J1	Malfunction of pressure sensor	
	J3	Malfunction of discharge pipe temperature sensor system (outdoor unit)	
	J3	Malfunction of discharge pipe temperature sensor system (outdoor unit)	
	J5	Suction pipe thermistor malfunction	
	J6	Malfunction of heat exchanger temperature sensor system (outdoor unit)	
	J7	Malfunction of subcooling heat exchanger thermistor (outdoor unit)	
	J8	Malfunction of liquid pipe thermistor (outdoor unit)	
	L1	Outdoor PC board malfunction	
	L4	Radiation fin temperature rise	Malfunction of inverter cooling
	L5	Instantaneous over current	Possibility of compressor motor grounding or shortage of motor winding
	L8	Electronic thermal	Possibility of compressor overload, open circuit in compressor motor
	L9	Stall prevention	Possibility of compressor seizing
	LC	Malfunction of transmission system (between control PCB and inverter PCB)	
	P1	Open phase or voltage unbalance	
	P4	Abnormal radiation fin temperature sensor (outdoor unit)	
	PJ	Failure of capacity setting (outdoor unit)	Either capacity data is set incorrectly, or capacity has not been set for the data IC

<table>
<tr><th></th><th>Malfunction code</th><th>Contents/Processing</th><th>Remarks</th></tr>
<tr><td rowspan="9">System malfunctions</td><td>U0</td><td rowspan="3">Lack of gas malfunction</td><td></td></tr>
<tr><td>U0</td><td rowspan="2">Abnormal suction pipe temperature</td></tr>
<tr><td>U0</td></tr>
<tr><td>U2</td><td>Abnormal power supply voltage</td><td>Including malfunction of K10R, K11R</td></tr>
<tr><td>U4/UF</td><td>Failure of transmission (between hydro-box and outdoor unit)</td><td>Transmission between hydro-box and outdoor unit is not being carried out correctly. [1]</td></tr>
<tr><td>UF</td><td>Failure of transmission (between hydro-box and outdoor unit)

or
Gas shortage</td><td>Transmission between hydro-box and outdoor unit is not being carried out correctly.
or
There is very little or no refrigerant flow within the hydro-box.</td></tr>
<tr><td>U5</td><td>Failure of transmission (between hydro-box and remote controller)</td><td>Transmission between hydro-box and remote controller is not being carried out correctly.</td></tr>
<tr><td>UA</td><td>Incorrect hydro-box connected to the system</td><td></td></tr>
</table>

Legend

Colour	Meaning
(white)	Error code displays automatically and system stops. Inspect and repair it.
(light grey)	In case of shaded error codes, ‘inspection’ is not displayed. The system operates but be sure to inspect and repair it.
(dark grey)	Error code displays with blinking. The system operates, but be sure to inspect and repair it.

Note

[1] There is a possibility of open phase power supply, check power supply also.

1.7 Fault Diagnosis by LED

Introduction

Several methodes can be used to consult the system malfunction.

Fault diagnosis by LED is applicable on hydro-box (PCB A1P) and outdoor unit (PCB A2P).

Overview

This chapter contains the following topics:

1.7.1 Troubleshooting by LED on the Hydro-box PCB

Overview

Troubleshooting can be carried out by service monitor LED (green). (Blinks when normal)

☼: LED on / ● : LED off / ☀ : LED blinks

Microcomputer Normal Monitor	Contents/Processing
HAP (LED-A)	
☼	Failure of hydro-box PC board ass'y (Note 5)
●	Malfunction of power supply or failure of PC board ass'y or broken transmission wire between indoor and outdoor unit. (Note 5)

3

Notes

1. When the INSPECTION/TEST button of remote controller is pushed, **INSPECTION** display blinks entering **INSPECTION** mode.
2. In the **INSPECTION** mode, when the ON/OFF button is pushed and held for 5 seconds or more, the aforementioned malfunctioning history display is off. In this case, after the malfunction code blinks 2 times, the code display turns to "00" (=Normal) and the unit No. turns to "0". The INSPECTION mode automatically switches to the normal mode (set temperature display).
3. Operation halts due to malfunction depending on the model or condition.
4. Troubleshoot by turning off the power supply for a minimum of 5 seconds, turning it back on, and then rechecking the LED display.

1.7.2 Troubleshooting by LED on the Outdoor PCB (A1P)

Overview

The following diagnosis can be conducted by turning on the power switch and checking the LED indication on the printed circuit board of the outdoor unit.

☼ : LED on / ● : LED off / ◑ : LED blinks / — : Not used for diagnosis

LED detection		Description
HAP	**H1P**	
(Green)	**(Red)**	
◑	●	Normal
☼	—	Faulty outdoor unit PCB (Note 1)
●	—	Power supply abnormality, or faulty outdoor unit PCB (Note 2)
◑	☼	Activation of protection device (Note 3)

Notes

1. Turn off the power switch, and turn it on again after 5 seconds or more. Check the error condition, and diagnose the problem.
2. Turn off the power switch. After 5 seconds or more, disconnect the connection wire (2). Then turn on the power switch. If the HAP on the outdoor unit PCB flashes after about 10 seconds, the hydro-box PCB is faulty.
3. Also check for open phase.

Remark

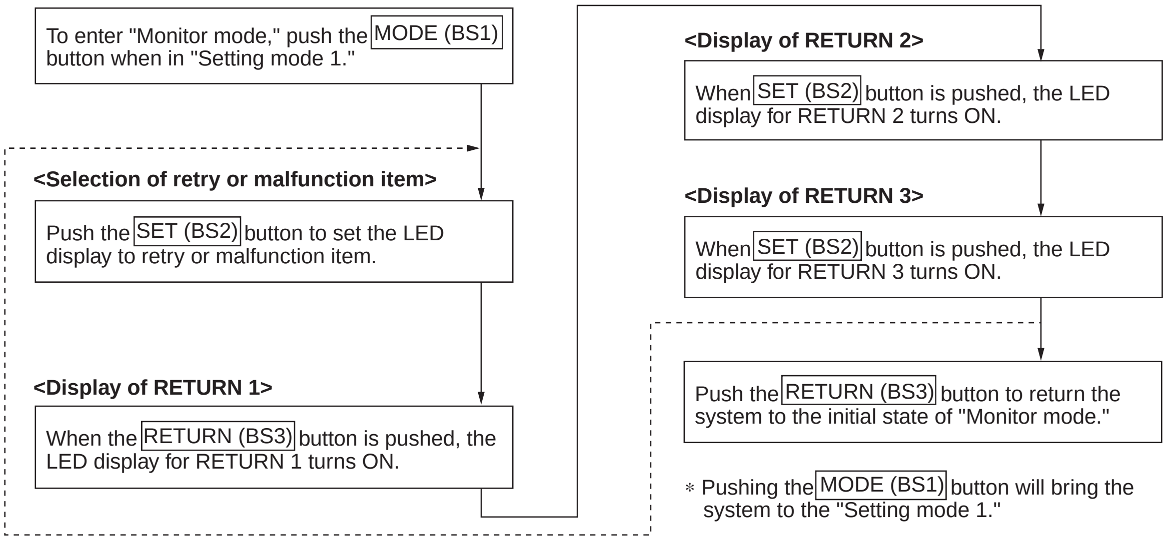
The error detection monitor continues to indication the previously generated error until the power switch is turned off.

Be sure to turn off the power switch after inspection.

3

1.7.3 Troubleshooting by LED on the Outdoor Service PCB (A2P)

Take the following steps to check contents of retry and malfunction:



Overview

☼: ON ●: OFF ◐: BLINK

Malfunction code	Contents of retry or malfunction		1 HAP	1 H1P	1 H2P	1 H3P	1 H4P	1 H5P	1 H6P	1 H7P	2 HAP	2 H1P	2 H2P	2 H3P	2 H4P	2 H5P	2 H6P	2 H7P	3 HAP	3 H1P	3 H2P	3 H3P	3 H4P	3 H5P	3 H6P	3 H7P
C4	Indoor heat exchanger thermistor		◐	◐	☼	●	●	●	◐	●	◐	◐	☼	●	●	◐	●	●	◐	◐	☼	☼	●	●	●	●
E1	Faulty outdoor PC board		◐	◐	●	☼	●	●	◐	◐	◐	◐	☼	●	●	●	●	◐	◐	◐	☼	☼	●	●	●	●
E3	Abnormal high pressure										◐	◐	☼	●	●	●	◐	◐	◐	◐	☼	☼	●	●	●	●
E4	Abnormal low pressure										◐	◐	☼	●	●	◐	●	●	◐	◐	☼	☼	●	●	●	●
E5	Compressor motor lock										◐	◐	☼	●	●	◐	●	◐	◐	◐	☼	☼	●	●	●	●
E7	Abnormal outdoor fan motor	DC motor 1 lock									◐	◐	☼	●	●	◐	◐	◐	◐	◐	☼	☼	●	●	●	◐
		DC motor 2 lock																	◐	◐	☼	☼	●	●	◐	●
		Abnormal inverter transmission																	◐	◐	☼	☼	●	●	◐	◐
E9	Abnormal electronic expansion valve	Disconnected electronic expansion valve connector									◐	◐	☼	●	◐	●	●	◐	◐	◐	☼	☼	●	●	●	◐
		Malfunction due to wet conditions																	◐	◐	☼	☼	●	●	◐	●
F3	Abnormal discharge pipe temperature	Abnormal discharge pipe temperature	◐	◐	●	☼	●	◐	●	◐	◐	◐	☼	●	●	●	◐	◐	◐	◐	☼	☼	●	●	●	◐
		Disconnected discharge pipe thermistor																	◐	◐	☼	☼	●	●	◐	●
H3	Abnormal high pressure switch		◐	◐	●	☼	●	◐	●	●	◐	◐	☼	●	●	●	◐	◐	◐	◐	☼	☼	●	●	●	●
H9	Abnormal outdoor air thermistor										◐	◐	☼	●	◐	●	●	◐	◐	◐	☼	☼	●	●	●	●
J1	Abnormal pressure sensor		◐	◐	●	☼	●	◐	◐	●	◐	◐	☼	●	●	●	●	◐	◐	◐	☼	☼	●	●	●	●
J3	Abnormal discharge pipe thermistor										◐	◐	☼	●	●	●	◐	◐	◐	◐	☼	☼	●	●	●	●
J5	Abnormal suction pipe thermistor										◐	◐	☼	●	●	◐	●	◐	◐	◐	☼	☼	●	●	●	●
J6	Abnormal heat exchanger distributor pipe thermistor										◐	◐	☼	●	●	◐	◐	●	◐	◐	☼	☼	●	●	●	●
J7	Abnormal intermediate heat exchanger thermistor										◐	◐	☼	●	●	◐	◐	◐	◐	◐	☼	☼	●	●	●	●
J8	Abnormal liquid pipe thermistor										◐	◐	☼	●	◐	●	●	●	◐	◐	☼	☼	●	●	●	●
L1	PC board failure		◐	◐	●	☼	●	◐	◐	◐	◐	◐	☼	●	●	●	●	◐	◐	◐	☼	☼	●	●	●	●
L4	Elevated radiation fin temperature										◐	◐	☼	●	●	◐	●	●	◐	◐	☼	☼	●	●	●	●
L5	Compressor instantaneous overcurrent										◐	◐	☼	●	●	◐	●	◐	◐	◐	☼	☼	●	●	●	●
L8	Compressor overload										◐	◐	☼	●	◐	●	●	●	◐	◐	☼	☼	●	●	●	●
L9	Compressor lock										◐	◐	☼	●	◐	●	●	◐	◐	◐	☼	☼	●	●	●	●
LC	Abnormal transmission (between the control and the inverter)										◐	◐	☼	●	◐	◐	●	●	◐	◐	☼	☼	●	●	●	●
P1	Unbalanced power supply voltage		◐	◐	●	☼	◐	●	●	●	◐	◐	☼	●	●	●	●	◐	◐	◐	☼	☼	●	●	●	●
P4	Abnormal radiation fin thermistor										◐	◐	☼	●	●	◐	●	●	◐	◐	☼	☼	●	●	●	●
PJ	Faulty capacity setting										◐	◐	☼	●	◐	◐	●	◐	◐	◐	☼	☼	●	●	●	●
U0	Abnormal gas shortage	Gas shortage warning	◐	◐	●	☼	◐	●	●	◐	◐	◐	☼	●	●	●	●	●	◐	◐	☼	☼	●	●	●	◐
		Abnormal gas shortage																	◐	◐	☼	☼	●	●	◐	●
U2	Abnormal power supply voltage	Inverter undervoltage and overvoltage									◐	◐	☼	●	●	●	◐	●	◐	◐	☼	☼	●	●	●	◐
		SP-PAM overvoltage																	◐	◐	☼	☼	●	●	◐	●
U4	Abnormal transmission (between indoor and outdoor units)										◐	◐	☼	●	●	◐	●	●	◐	◐	☼	☼	●	●	●	●
UA	Faulty field setting switch										◐	◐	☼	●	◐	●	◐	●	◐	◐	☼	☼	●	●	●	●
UF	Improper piping and improper communication wiring														◐	◐	◐	◐	◐	◐	☼	☼	●	●	●	●

3

1.8 Overview of Error Codes

3

1.8.1 Hydro-box Malfunction

Explanation for symbols

◎ : High probability of malfunction

○ : Possibility of malfunction

☐ : Low probability of malfunction

— : No possibility of malfunction (do not replace)

Overview

Remote Controller Display	Location of Malfunction				Contents of Malfunction	Details of Malfunction (Reference Page)
	Other than PC Board	PC Board				
		Outdoor Unit	hydro-box	Remote Controller		
80	◎	—	—	—	Inlet water temperature thermistor abnormality	3–43
81	◎	—	—	—	Outlet water temperature thermistor abnormality	3–43
89	◎	—	—	—	Water heat exchanger freez-up abnormality	
7H	◎	—	—	—	Flow abnormality	
8H	◎	—	—	—	Outlet water temperature too high	
AA	◎	—	—	—	Booster heater thermal protector is open	
A1	—	○	◎	☐	Hydro-box PCB abnormality	3–42
C0	◎	—	—	—	Flow switch abnormality	
C4	◎	—	—	—	Heat exchanger thermistor abnormality	3–43
EC	◎	—	—	—	Domestic hot water temperature too high	
HC	◎	—	—	—	Domestic hot water temperature thermistor abnormality	3–43

3

1.8.2 Outdoor Unit Malfunction

Explanation for symbols

◎ : High probability of malfunction

○ : Possibility of malfunction

□ : Low probability of malfunction

— : No possibility of malfunction (do not replace)

Overview

Remote Controller Display	Location of Malfunction				Contents of Malfunction	Details of Malfunction (Reference Page)
	Other than PC Board	PC Board				
		Outdoor Unit	hydro-box	Remote Controller		
E1	•	•	—	—	Outdoor unit P.C board malfunction	3–54
E3	•	—	—	—	Abnormality of high pressure (HPS)	3–55
E4	•	®	—	—	Abnormality of low pressure (outdoor)	3–57
E5	•	®	—	—	Compressor motor lock malfunction	3–60
E7	•	®			Malfunction of outdoor unit fan motor	3–62
E9	•	®	—	—	Malfunction of Electronic expansion valve	3–65
F3	•	®	—	—	Discharge pipe temperature malfunction	3–68
H3	•	•	—	—	Faulty high pressure switch (HPS)	3–70
H9	•	®	—	—	Malfunction of outdoor air temperature sensor system	3–72
J1	•	®	—	—	Malfunction of pressure sensor	3–73
J3	•	®	—	—	Malfunction of discharge pipe temperature sensor system	3–72
J5	•	®	—	—	Suction pipe thermistor malfunction	3–72
J6	•	®	—	—	Malfunction of heat exchanger temperature sensor system	3–72
J7	•	®	—	—	Malfunction of subcooling heat exchanger temperature sensor system (outdoor unit)	3–72
J8	•	®	—	—	Malfunction of liquid pipe thermistor (outdoor unit)	3–72
L1		•	—	—	Outdoor PC board malfunction	3–75
L4	•	®	—	—	High temperature of radiation fin	3–77
L5	•	®	—	—	Overcurrent of DC output (instantaneous)	3–79
L8	•	®	—	—	Electronic thermal switch (time lag)	3–81
L9	•	®	—	—	Stall prevention (time lag)	3–83
LC	•		—	—	Malfunction of transmission system (between control PCB and inverter PCB)	3–85
P1	•	®	—	—	Open phase or voltage unbalance	3–87
P4	•	®	—	—	Malfunction of radiator fin temperature thermistor	3–88
PJ	•	®	—	—	Error in capacity setting	3–89

1.8.3 System Malfunction

Explanation for symbols

◎ : High probability of malfunction

○ : Possibility of malfunction

☐ : Low probability of malfunction

— : No possibility of malfunction (do not replace)

Overview

Remote Controller Display	Location of Malfunction				Contents of Malfunction	Details of Malfunction (Reference Page)
	Other than PC Board	PC Board				
		Outdoor Unit	hydro-box	Remote Controller		
U0	•	—	—	—	Gas shortage	3–92
U2	•	®	—	—	Abnormal power supply voltage	3–94
U4 or UF	•			—	Transmission error (between hydro-box and outdoor unit) [1]	3–96
UF	•			—	Malfunction of transmission (between hydro-box and outdoor unit) or Gas shortage	3–99
U5	•	—			Transmission error (between hydro-box and remote controller)	3–101
UA	•	—		—	Incorrect hydro-box connected to this system	3–102

Note

[1] Possibility of open phase power supply.

1.9 Overview of the Outdoor Safety Devices

	High pressure switch		Fuse
	Open	Close	
ERHQ011~016	4.0 Mpa +0/-0.15	3.0 +/-0.15	6.3A/250V

3

1.10 Overview of the Hydro-box Safety Devices

Hydro-box

	Protector	Cut-out condition	Reference
EKHBH(X)016	Q1L (Clixon)	75 ± 4°C	AS17WW0046-B
	F1T (Thermal fuse)	94°C +0 / -10°C	
	S1L	16 l / min	4SW04143-1

Tank

	Protector (Clixon)	Cut-out condition	Reference
EKSWW	Q2L	85°C ± 3°C	4SW03476-1
EKSWWU	Q2L	85°C ± 3°C	4SW03476-1
	Q3L	85°C ± 3°C	
EKHWS - V3	Q2L	85°C ± 3°C	4SW05637-1
	Q3L	85°C ± 3°C	
EKHWS - Z2	Q2L	91°C ± 3°C	4SW05637-2
	Q3L	85°C ± 3°C	4SW05637-1
EKHWSU - V3	Q2L	85°C ± 3°C	4SW05637-3
	Q3L	85°C ± 3°C	
EKHWE - V3	Q2L	89°C +0 / -8°C	4SW05724-1
EKWE - Z2	Q2L	89°C +0 / -8°C	4SW05724-1
	Q3L	89°C +0 / -8°C	

3

3

2 Error Codes: Hydro-box

2.1 What Is in This Chapter?

Introduction

In the first stage of the troubleshooting sequence, it is important to correctly interpret the error code on the remote controller display. The error code helps you to find the cause of the problem.

Shutdown

For some errors, the system only shuts down when the error occurs several times. This means that you have to wait until the system shuts down to be able to see the flashing LED on the front panel and the error code on the remote controller.

Overview

This chapter contains the following topics:

2.2 "A1" Malfunctioning Hydro-box PCB

Remote controller display

A1

LED indications

The table below shows the LED indications.

Operation	HAP (green)
Normal	◐
Malfunctioning	◐
	◐
	☼
	●

Error generation

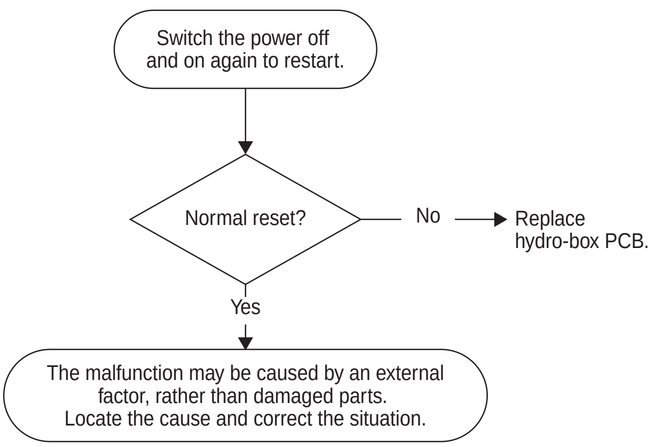
The error is generated when the data from the EEPROM is not received correctly.

EEPROM (Electrically Erasable Programmable Read Only Memory): A memory chip that holds its content without power. It can be erased, either within the computer or externally and usually requires more voltage for erasure than the common +5 volts used in logic circuits. It functions like non-volatile RAM, but writing to EEPROM is slower than writing to RAM.

Supposed causes

The possible cause is a malfunctioning hydro-box PCB.

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

2.3 "C4, 81, 80, HC" Thermistor or Related Abnormality (Hydro-box)

Remote controller display

C4, 81, 80, HC

Method of malfunction detection

The temperatures detected by the thermistors are used to determine thermistor errors.

Malfunction decision conditions

When the thermistor input is more than 4.96 V or less than 0.04 V during compressor operation*.
* (reference)

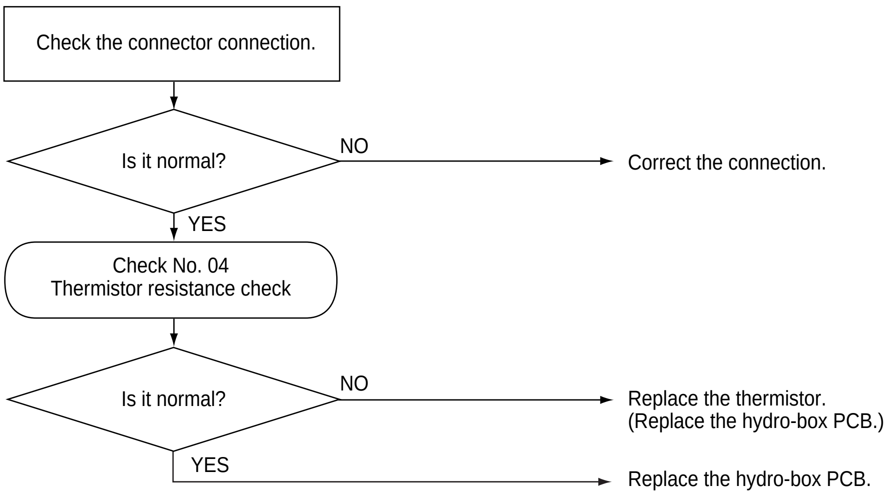
When above about 212°C (less than 120 ohms) or below about –50°C (more than 1,860 kohms).

Note: The values vary slightly in some models.

Supposed causes

- Faulty connector connection
- Faulty thermistor
- Faulty PCB

Troubleshooting



C4: Hydro-box heat exchanger thermistor
81: Outlet water temperature thermistor
80: Inlet water temperature thermistor
HC: Domestic hot water temperature thermistor

(*) See also "Check No.4 - Resistance Conversion Table (Ambient, Coil, Fin)" on page 3-107.

2.4 "7H" Hydro-box

Remote controller display

7H

Method of malfunction detection

The malfunction is detected by the flow switch.

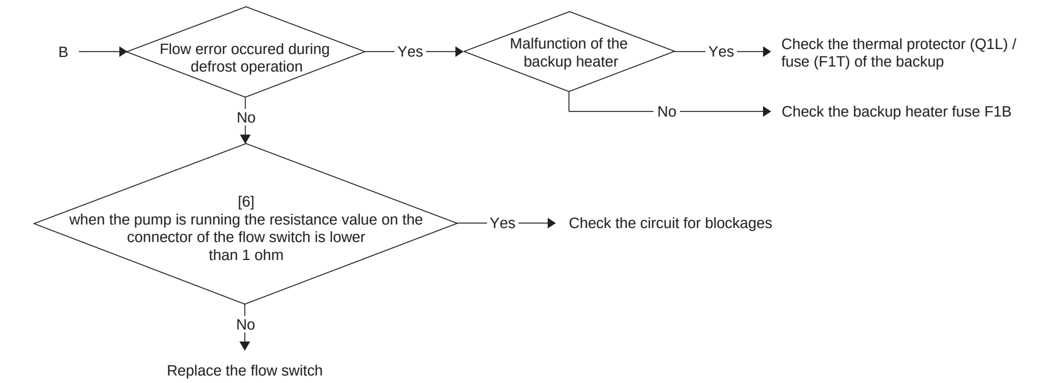
Malfunction decision conditions

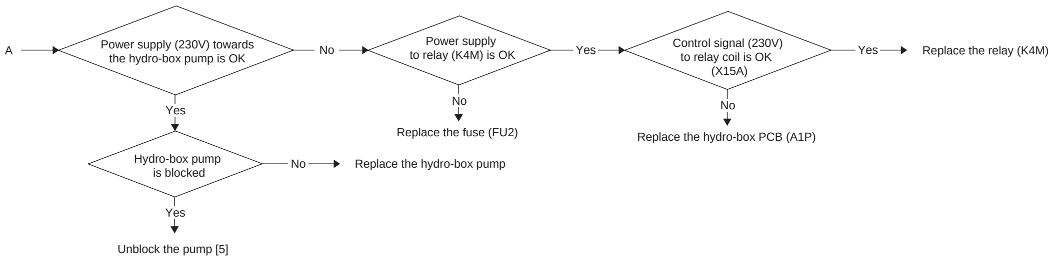
The error is generated in case the water flow is too low or no water flow at all (minimum required water flow is 16 l/min).

Supposed causes

- Closed shut off valve
- Air in the system
- Clogged water filter
- Insufficient water pressure
- Too high external static pressure (pump speed setting)
- Malfunction of hydro-box pump
- Hydro-box pump fuse open [FU2]
- Malfunction of hydro-box pump relay [K4M]
- During defrost
  - Malfunction of the backup heater [Q1L, F1T]
  - Backup heater fuse [F1B]
- In case of EKSWW(U) / EKHWS(U) / EKHWE
  - Malfunction of the 3-way valve
- In case of the EKSWWU / EKHWSU
  - Malfunction of the tank thermostat [Q1T, Q3L]
  - Malfunction of 2-way valve

Troubleshooting





[1]: When the pump starts (push the ON/OFF button), manometer needle moves, pump vibrations can be detect. In case unclear perform item A.

[2]: When the pump runs, pump signal is displayed on the interface controller. The pump will run for 15 seconds before error code 7H will be displayed.

In order perform item A completely, several pump restarts can be required.

[3]: Check the installation manual for the minimum required water pressure in the system.

[4]: Check the installation manual for the external static pressure values of the different pump speeds.

[5]: Close the shut-off valves, reduce the water pressure (check manometer). Remove the front screw to unblock the pump rotor.

[6]: Disconnect the connector of the flow switch on the PCB (X4A) and measure the resistance value on the connector of the flow switch.

At a restart of the system, the pump will operate for 15 seconds before error code occurs.

Use this 15 seconds to confirm the resistance value of the flow switch before the pump will be stopped due to error 7H.

2.5 "8H" Hydro-box: Outlet water temperature too high (> 65°C)

Remote controller display

8H

Method of malfunction detection

The malfunction is detected by outlet water thermistor after backup heater [R2T].

Malfunction decision conditions

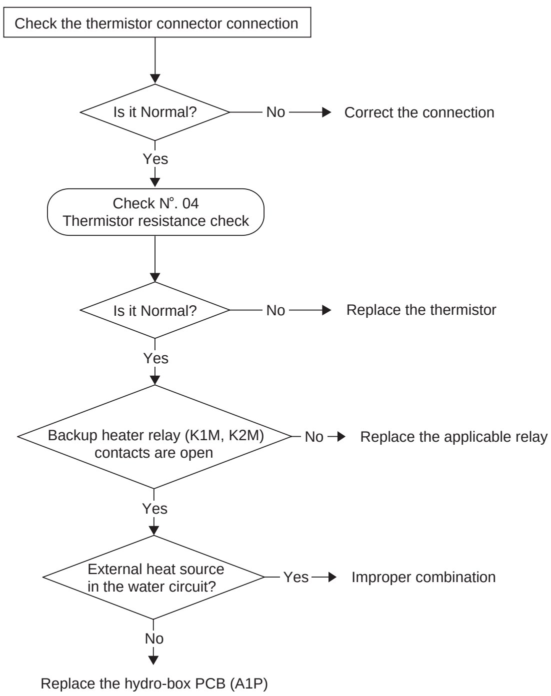
The error is generated in case the outlet water temperature is higher than 65°C.

Supposed causes

- Malfunction of the outlet water thermistor [R2T]
- Malfunction of the backup heater relays [K1M, K2M]
- In case of combination of boiler
  - Incorrect cooperation of systems

3

Troubleshooting



2.6 "AA" Hydro-box: Open thermal protector / fuse of backup heater or booster heater

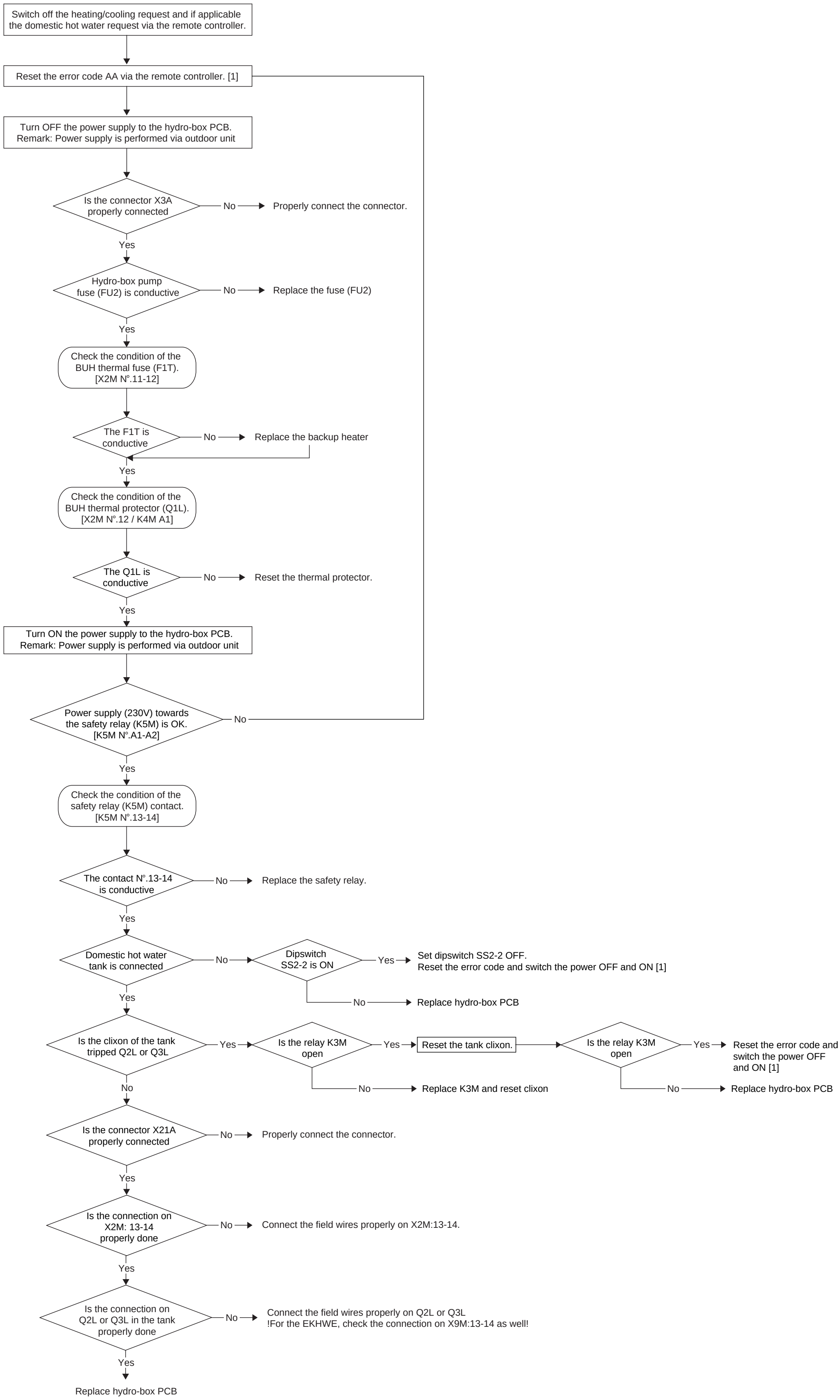
3

Remote controller display	AA

Method of malfunction detection	The malfunction is detected by activation of thermal protector of the:
	■ Backup heater [Q1L, F1T]
	■ Booster heater
	  ■ Q2L: EKSWW / EKHWE / EKHWS***V3 / EKHWSU
	  ■ Q3L: EKSWWU / EKHWS***Z2

Malfunction decision conditions	The error is generated in case the temperature of the backup heater or booster heater rise above specific temperature.
Supposed causes	■ Malfunction of the booster heater relay [K3M] ■ Malfunction of the backup heater relays [K1M, K2M] ■ Incorrect parameter of the solar pump station (maximum tank temperature is too high, etc.)

Troubleshooting



[1]: The error has to be erased from the memory via the remote controller before the power is switched OFF and ON.

The error code has to be erased via following procedure:

A) Switch off the heating / cooling request and if applicable the domestic hot water request via the remote controller.

B) Push the "inspection / test button" (the error code will be displayed and 'inspection' icon is blinking) and press the ON/OFF button till the error code is replaced by '00'.

3

2.7 "C0" Hydro-box: Flow switch failure

Remote controller display

C0

Method of malfunction detection

The protection device circuit checks the flow input signal during pump stop operation.

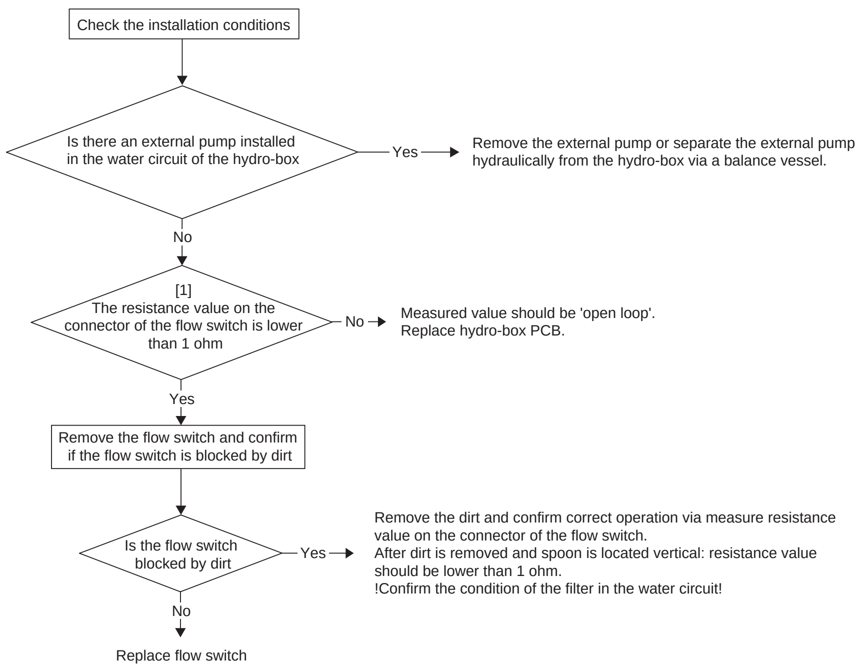
Malfunction decision conditions

The error is generated in case flow input signal during pump stop operation occurs.

Supposed causes

- Blocked flow switch
- Malfunction of the flow switch
- Water flow caused by external source

Troubleshooting



[1]: Disconnect the connector of the flow switch on the PCB (X4A) and measure the resistance value on the connector of the flow switch.

3

2.8 "EC" Hydro-box: Domestic hot water tank temperature too high (> 89°C)

Remote controller display

EC

Method of malfunction detection

The malfunction is detected by domestic hot water tank thermistor (R5T).

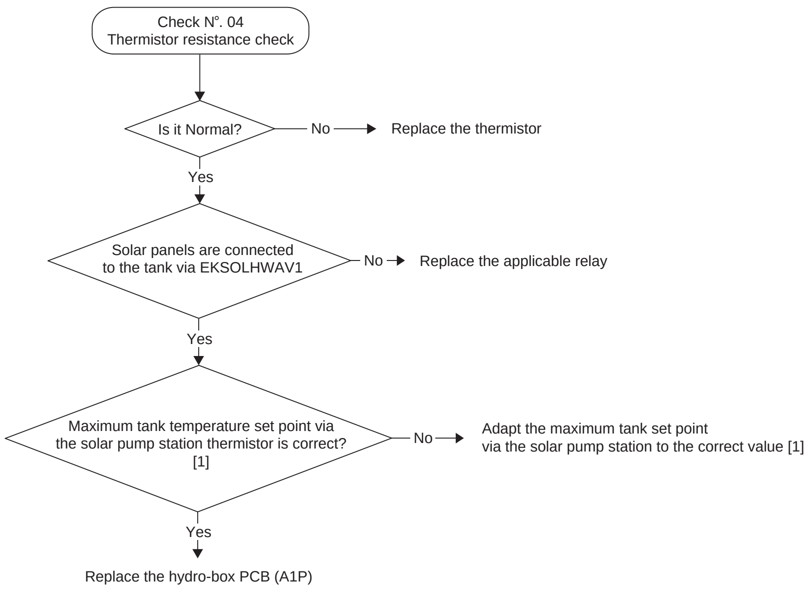
Malfunction decision conditions

The error is generated in case the domestic hot water tank temperature rise above 89°C.

Supposed causes

- Malfunction of the domestic hot water tank thermistor [R5T]
- Incorrect parameters on the solar pump station

Troubleshooting



[1]: Confirm the maximum allowed tank temperature via solar panels in the installation manual of EKSOLHWAV1.

3 Error Codes: Outdoor Units

3.1 What Is in This Chapter?

Introduction

In the first stage of the troubleshooting sequence, it is important to correctly interpret the error code on the remote controller display. The error code helps you to find the cause of the problem.

3

Overview

This chapter contains the following topics:

3.2 "E1" Outdoor Unit PCB Abnormality

Remote controller display

E1

Method of malfunction detection

Microcomputer checks whether E^2PROM is normal.

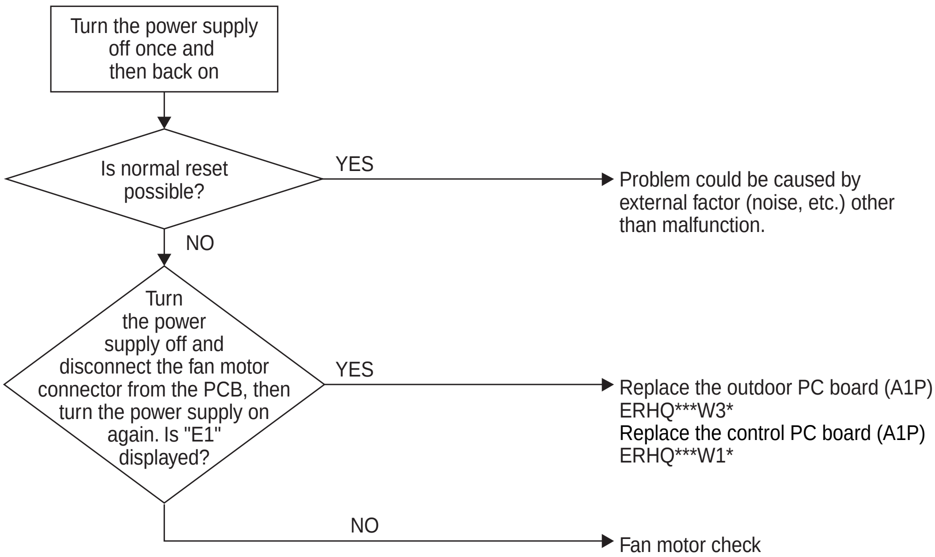
Malfunction decision conditions

E^2PROM:
When E^2PROM malfunctions when turning the power supply on

Supposed causes

Faulty outdoor unit PCB

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.3 "E3" Abnormal High Pressure (Detected by the HPS)

Remote controller display

E3

Method of malfunction detection

The protection device circuit checks continuity in the high pressure switch.

Malfunction decision conditions

When the high pressure switch is actuated
Actuating pressure:

Supposed causes

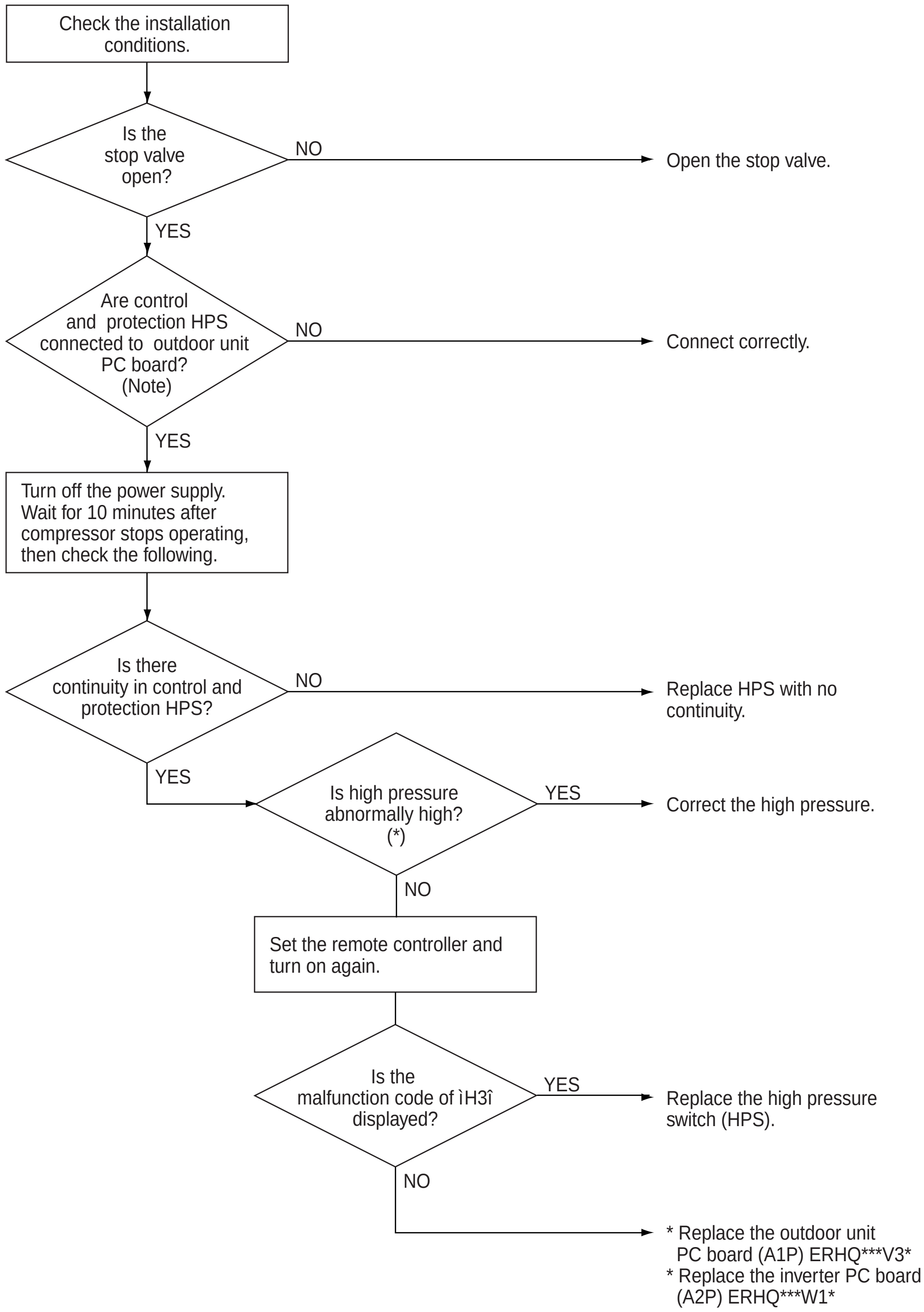
- Faulty high pressure switch
- Disconnection in high pressure switch harness
- Faulty connection of high pressure switch connector
- Clogged hydro-box suction filter (in heating operation)
- Dirty outdoor unit heat exchanger
- Faulty outdoor unit fan
- Refrigerant overcharge
- Stop valve is left in closed.

HPS settings

The table below contains the preset HPS values.

	High pressure switch		Fuse
	Open	Close	
ERHQ011AAV3	4.0 Mpa +0/-0.15	3.0 +/-0.15	6.3A/250V
ERHQ014AAV3			
ERHQ016AAV3			

Troubleshooting



(*) See also "Check No.6 - Evaluation of Abnormal High Pressure" on page 3-110.

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.4 "E4" Actuation of Low Pressure Sensor

Remote controller display

E4

Method of malfunction detection

[In cooling]

- Detect malfunctions by the pressure sensor (S1NPH).

[In heating]

- Detect malfunctions by the heat exchanger distribution pipe thermistor (R4T).

Malfunction decision conditions

[In cooling]

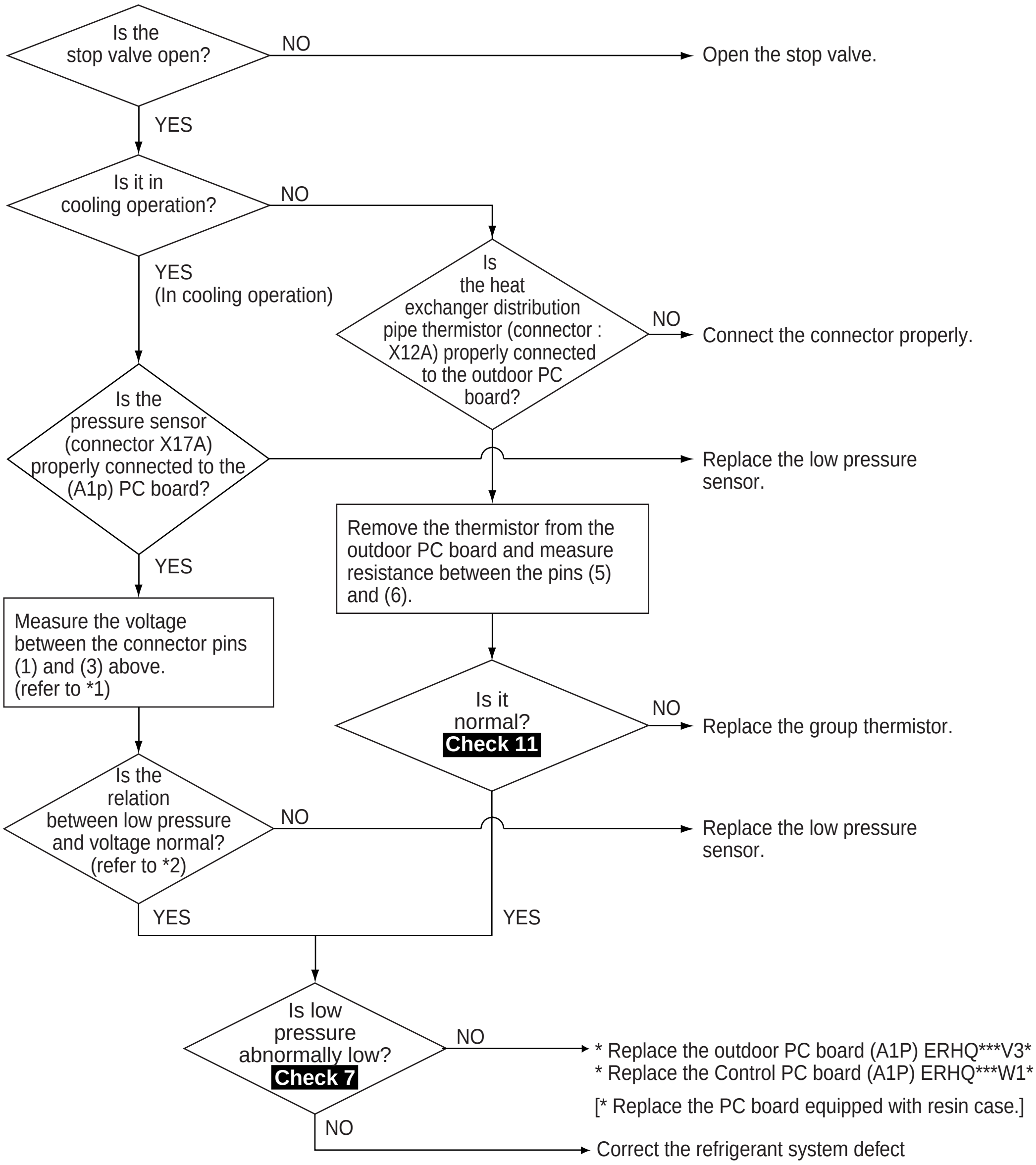
- When the detection pressure is the following value:
  0.12 MPa or less continues for 5 minutes
- When the saturated pressure equivalent to the detection temperature is the following value:
  0.12 MPa or less continues for 5 minutes

Supposed causes

- The stop valve remains closed
- Faulty pressure sensor and intermittent harness
- Faulty outdoor PC board
- Abnormal drop of low pressure
  (inadequate refrigerant)
  (Abnormal refrigerant piping system (liquid pipe system))
  (Faulty electronic expansion valve)

3

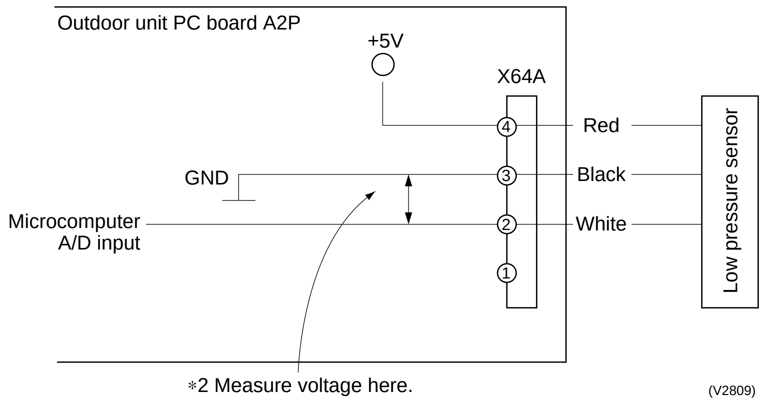
Troubleshooting

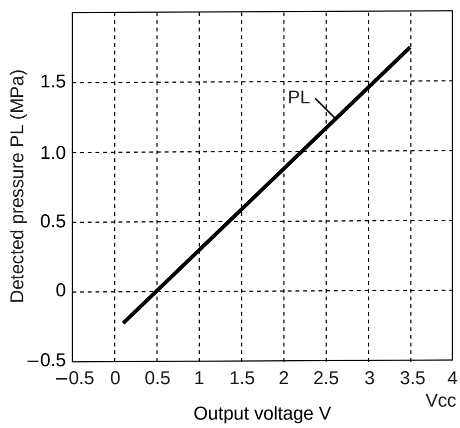


See also

- "Check No.7 - Evaluation of Abnormal Low Pressure" on page 3-111.
- "Check No.11 - Outdoor unit: Check for Power Transistor" on page 3-115.

Graphs





PL=0.57V–0.28
PL: detected pressure (Mpa)
V: output voltage (V)

Caution

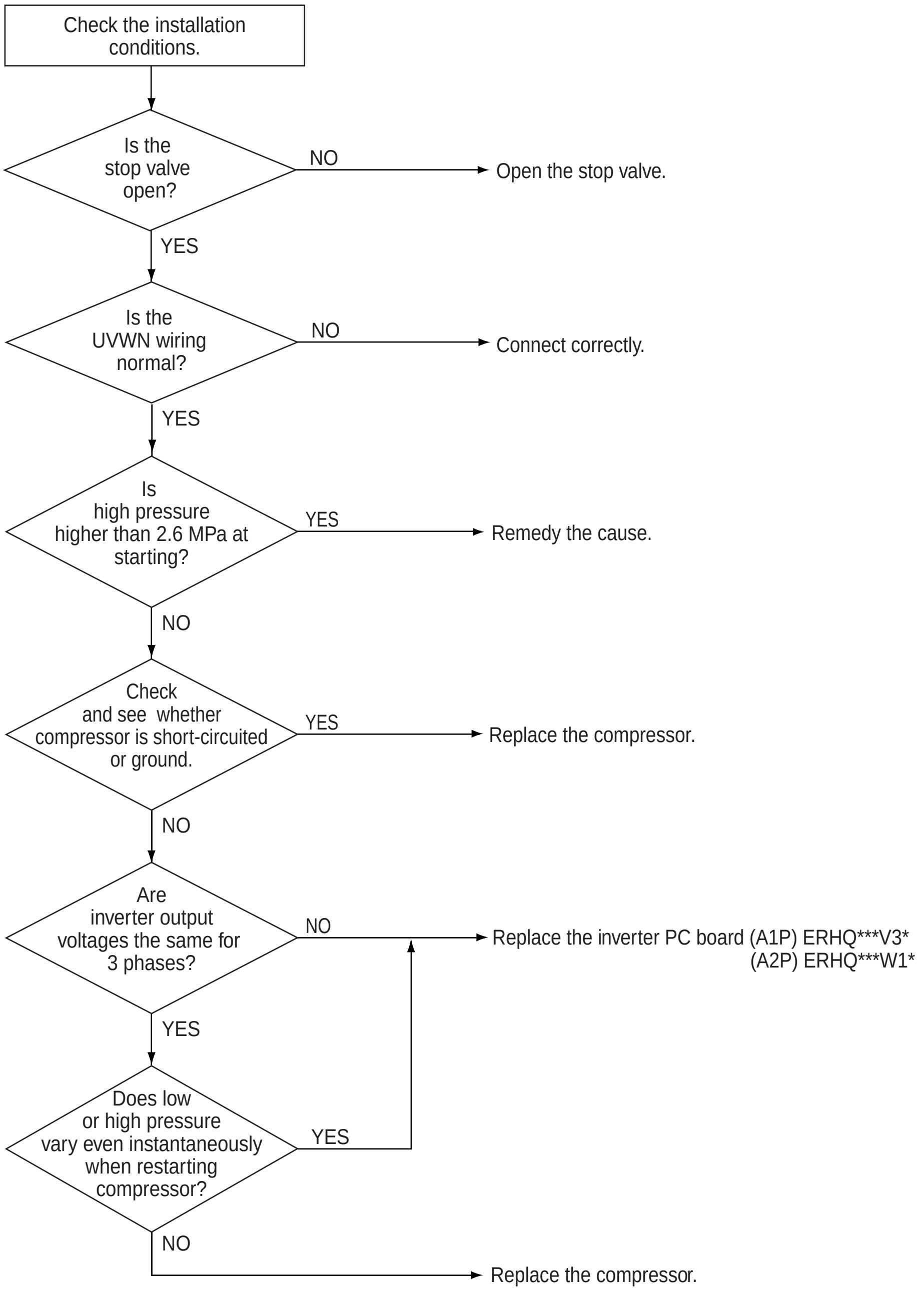
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3

3.5 “E5” Compressor Motor Lock

Remote controller display	E5
Method of malfunction detection	Inverter PC board takes the position signal from UVWN line connected between the inverter and compressor, and detects the position signal pattern.
Malfunction decision conditions	The position signal with 3 times cycle as imposed frequency is detected when compressor motor operates normally, but 2 times cycle when compressor motor locks. When the position signal in 2 times cycle is detected
Supposed causes	■ Compressor lock ■ High differential pressure (2.6MPa or more) starting ■ Incorrect UVWN wiring ■ Faulty inverter PC board ■ Stop valve is left in closed.

Troubleshooting



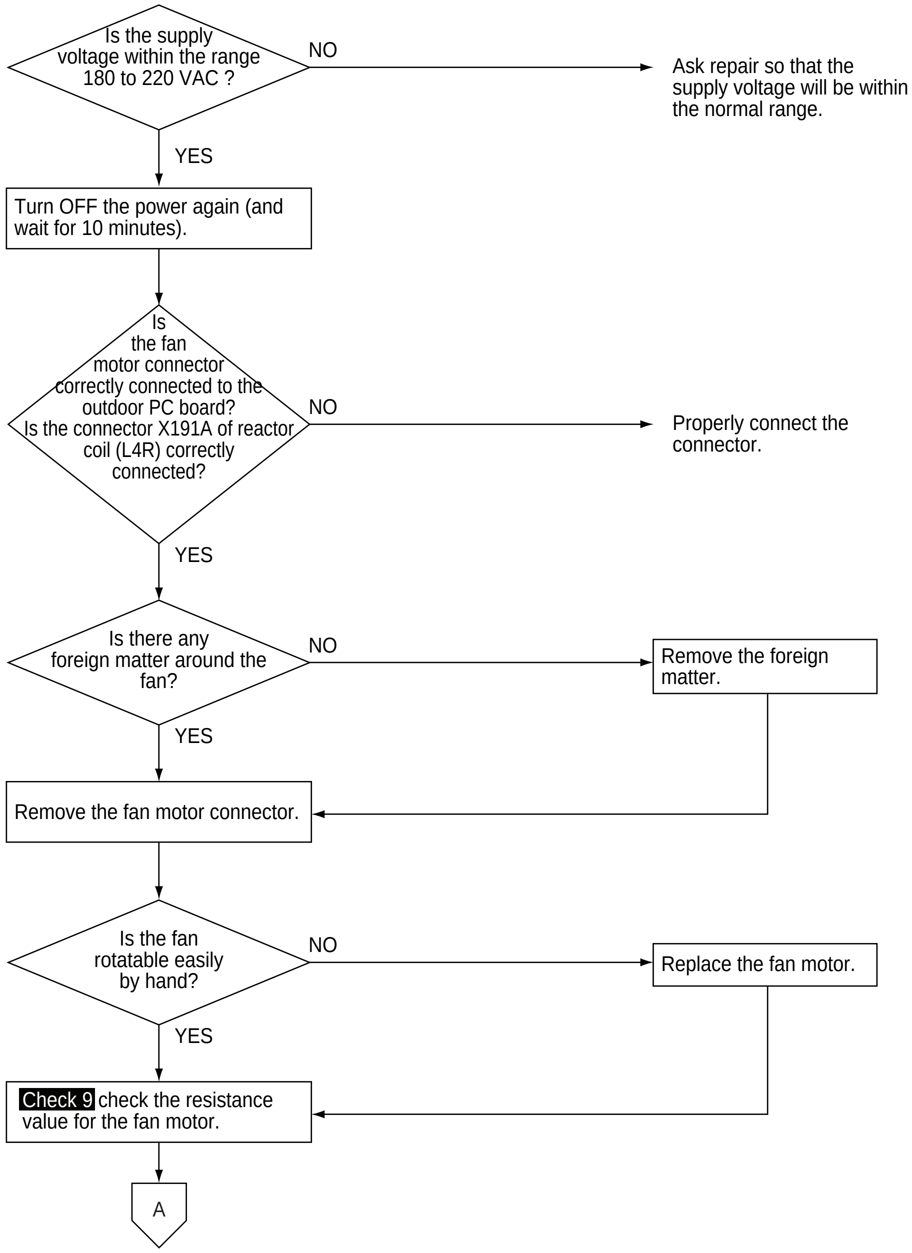
Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.6 "E7" Malfunction of Outdoor Unit Fan Motor

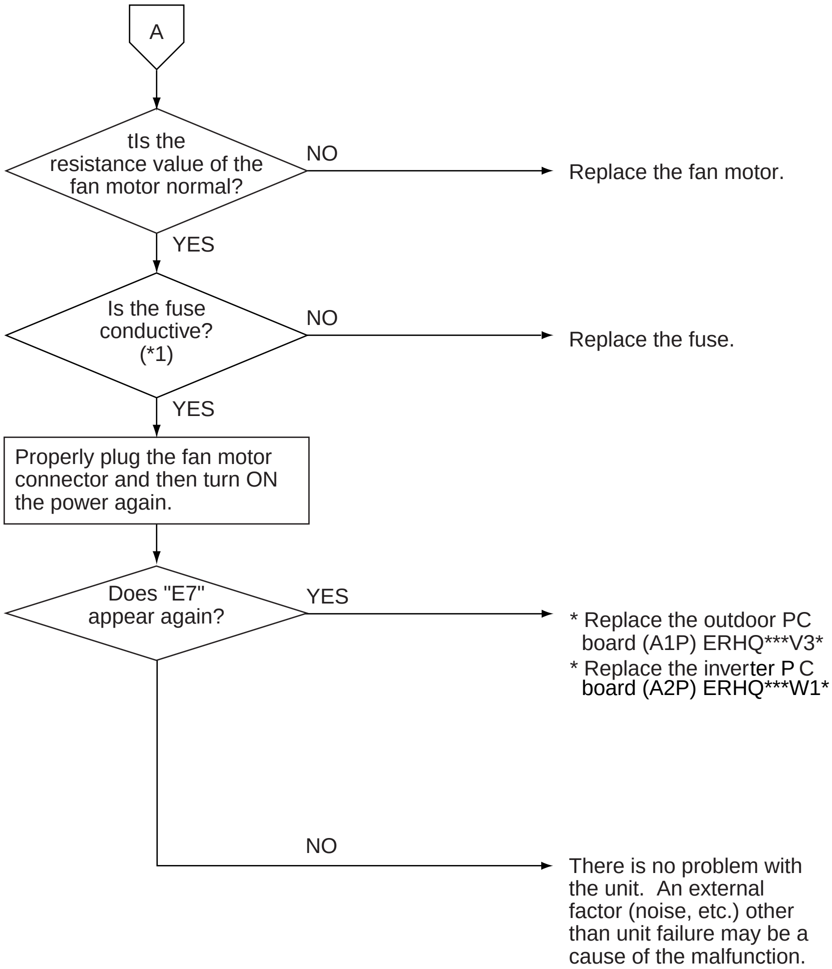
Remote controller display	E7
Method of malfunction detection	Abnormality of fan motor system is detected according to the fan speed detected by hall IC when the fan motor runs.
Malfunction decision conditions	■ When the fan runs with speed less than a specified one for 15 seconds or more when the fan motor running conditions are met ■ When connector detecting fan speed is disconnected ■ When malfunction is generated 4 times, the system shuts down.
Supposed causes	■ Malfunction of fan motor ■ The harness connector between fan motor and PC board is left in disconnected, or faulty connector ■ ERHQW1* only: faulty connector X191A (L4R) ■ Fan does not run due to foreign matters tangled ■ Malfunction of the outdoor (inverter) PC board ■ Blowout of fuse

Troubleshooting



(*) See also "Check No.9 - Outdoor Unit: Fan Motor Signal Line" on page 3-113.

3



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

(*1): FUSE CONDUCTIVE

EKHQ011~016AAV3	F6U (A1P) [outdoor pc board]
EKHQ011~016AAW1	F7U (A2P) [inverter pc board]

3.7 "E9" Malfunction of Electronic Expansion Valve

Remote controller display

E9

Method of malfunction detection

Method is determined according to the suction pipe superheat degree and electronic expansion valve opening degree calculated by values of low pressure sensor and suction pipe temperature thermistor.

Malfunction decision conditions

When the following conditions are met for 10 minutes

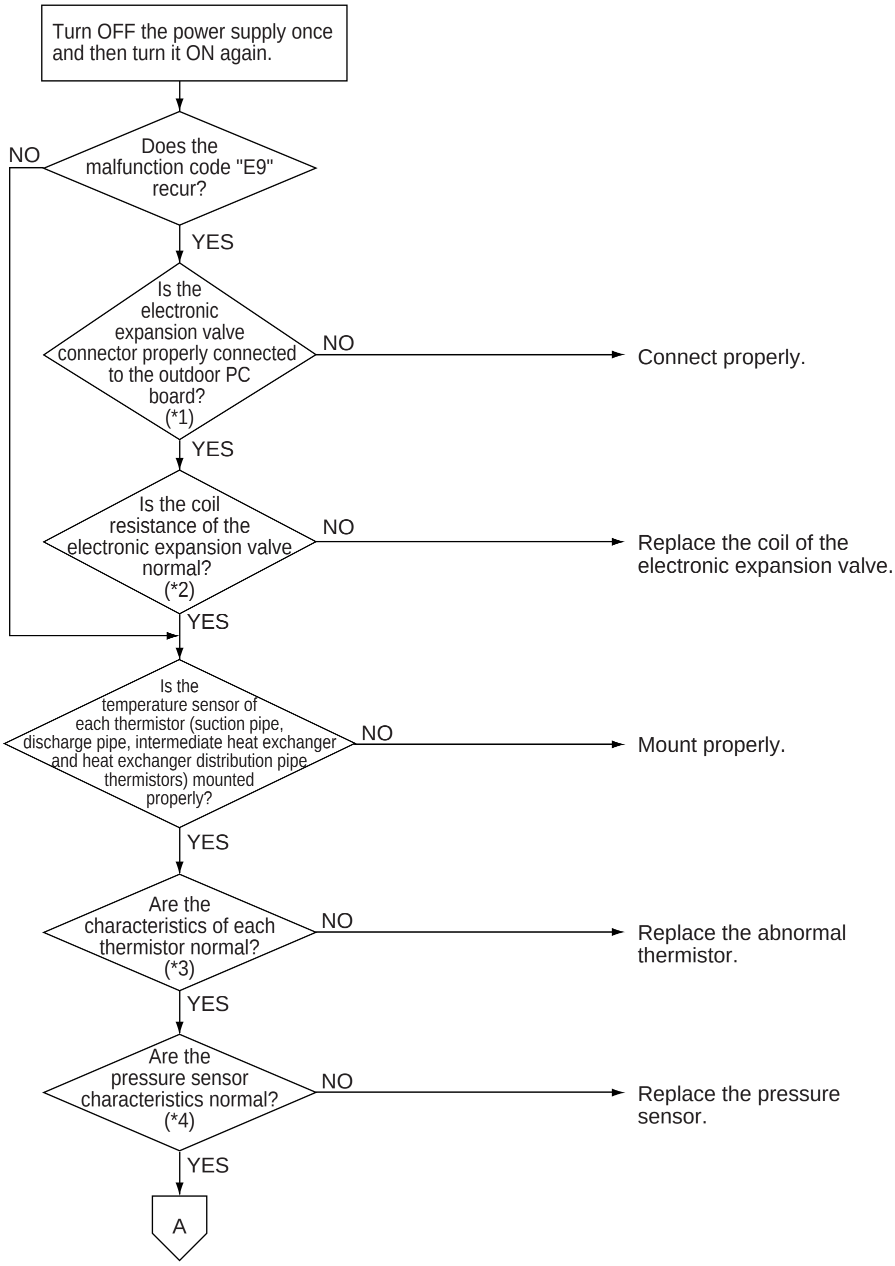
- Suction pipe superheat degree < 4°C
- Minimum electronic expansion valve opening degree
- Connector of electronic expansion valve is missing when the power is on.

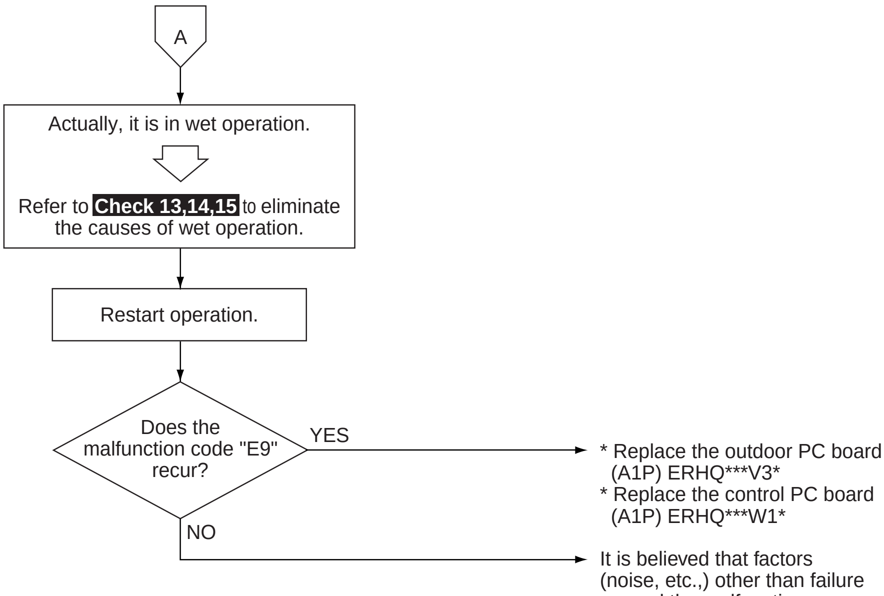
Supposed causes

- Faulty electronic expansion valve
- Faulty solenoid valve
- Faulty check valve
- Disconnection of electronic expansion valve harness
- Faulty connection of electronic expansion valve connector
- Faulty each thermistor
- Faulty mounting
- Faulty pressure sensor
- Faulty Outdoor control PC board

3

Troubleshooting

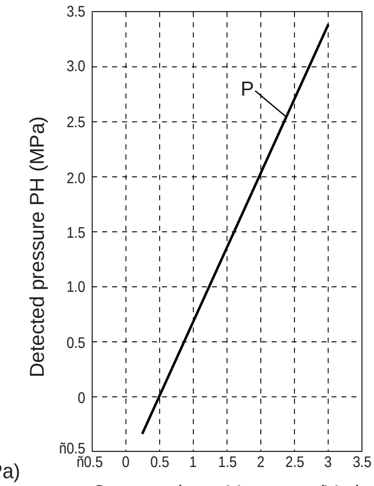




*1: Electronic expansion valve and connector No. → X21A
*2: Electronic expansion valve connector and coil resistance criteria

Measurement spot	Criteria
1 - 5	40 ~ 50W
2 - 5	40 ~ 50W
3 - 5	40 ~ 50W
4 - 5	40 ~ 50W

*3: For thermistor temperature and resistance characteristics, see **Check 4,5**
*4: For voltage characteristics of the pressure sensor, see the right figure.



P = 1.38V ñ 0.69
P : Detected pressure (MPa)
V : Output voltage

See also

- "Check No.4 - Resistance Conversion Table (Ambient, Coil, Fin)" on page 3-107.
- "Check No.5 - Resistance Conversion Table (Discharge Pipe Sensor)" on page 3-109.
- "Check No.13 - Check for Inadequate Refrigerant" on page 3-116.
- "Check No.14 - Check for Excessive Refrigerant Charging" on page 3-118.
- "Check No.15 - Check for Factors Causing Wet Operation" on page 3-119.

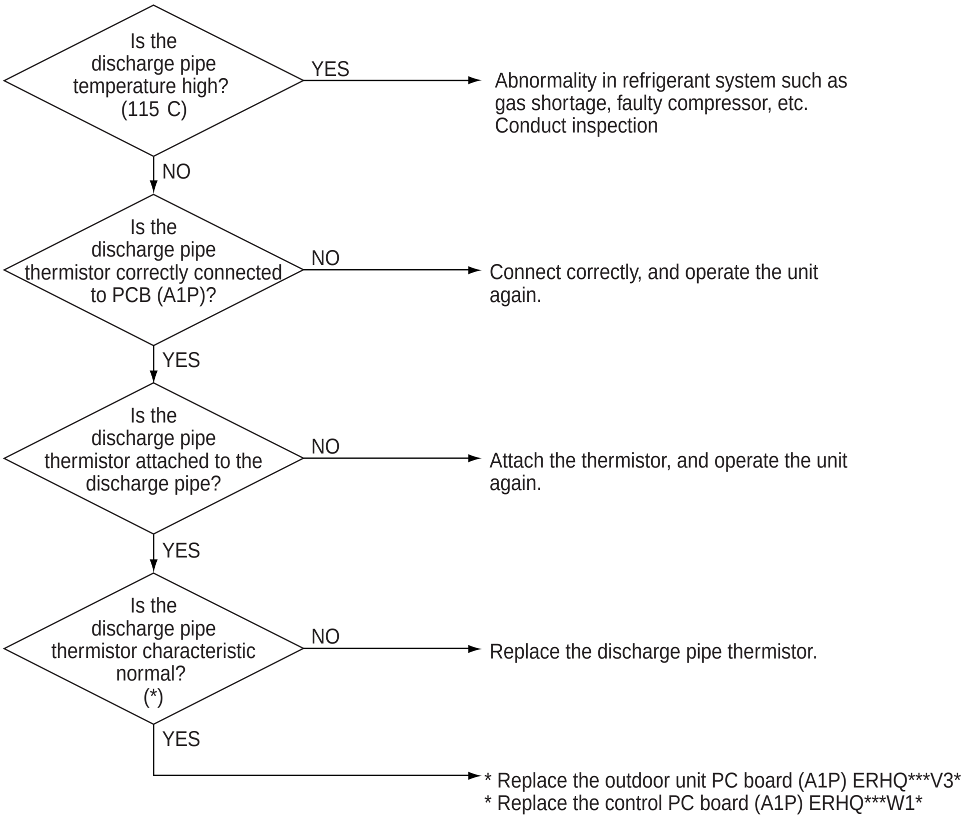
Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.8 "F3" Malfunctioning in Discharge Pipe Temperature

Remote controller display	F3
Method of malfunction detection	Abnormality is detected according to the temperature detected by the discharge pipe temperature sensor.
Malfunction decision conditions	■ When the discharge pipe temperature rises to an abnormally high level ■ When the discharge pipe temperature rises suddenly
Supposed causes	■ Faulty discharge pipe thermistor ■ Faulty connection of discharge pipe thermistor ■ Insufficient refrigerant amount ■ Faulty compressor ■ Disconnection of discharge pipe thermistor

3

Troubleshooting



(*) See also "Check No.5 - Resistance Conversion Table (Discharge Pipe Sensor)" on page 3-109.

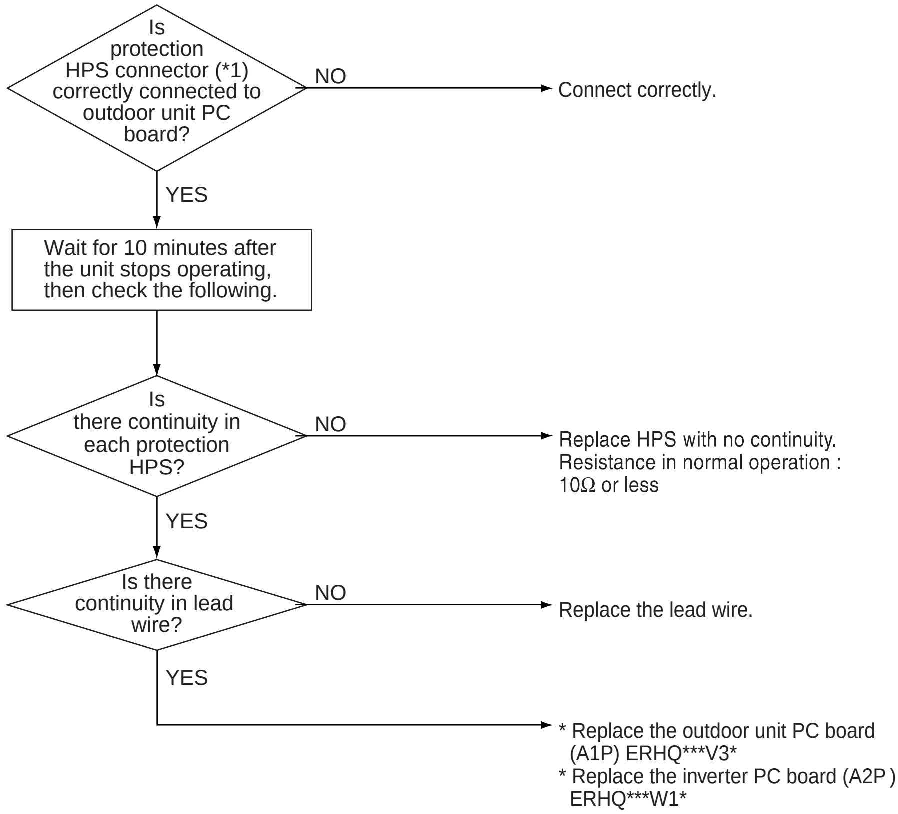
Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.9 "H3" Malfunctioning HPS System

Remote controller display	H3
Method of malfunction detection	The protection device circuit checks continuity in the high pressure switch.
Malfunction decision conditions	When there is no continuity in the high pressure switch during compressor stops operating.
Supposed causes	■ Incomplete high pressure switch ■ Disconnection in high pressure switch harness ■ Faulty connection of high pressure switch connector ■ Faulty outdoor unit PC board ■ Disconnected lead wire

Troubleshooting



*1 Connector symbol
ERHQ011~016AAV3: X32A (A1P)
ERHQ011~016AAW1: X32A (A2P)

Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.10 "H9, J3, J5, J6, J7, J8" Thermistor or Related Abnormality (Outdoor Unit)

Remote controller display

H9, J3, J5, J6, J7, J8

Method of malfunction detection

Abnormality is detected according to the temperature detected by each individual thermistor.

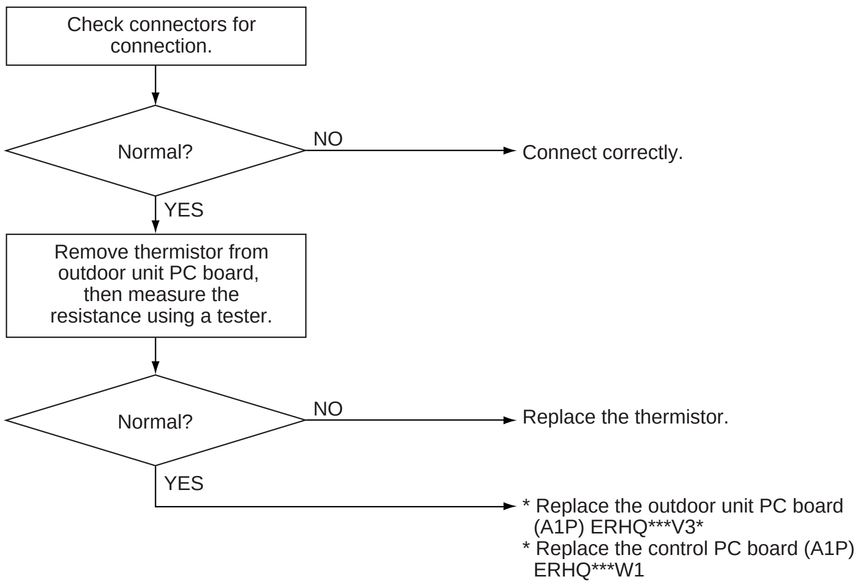
Malfunction decision conditions

When thermistor is disconnected or short-circuited during operation

Supposed causes

- Faulty thermistor
- Faulty connection of connector
- Faulty outdoor unit PC board (control PC board)

Troubleshooting



H9 : Malfunction of outdoor temperature thermistor system
J3 : Malfunction of discharge pipe thermistor system
J5 : Malfunction of suction pipe thermistor system
J6 : Malfunction of heat exchange thermistor
J7: Malfunction of subcooling heat exchanger thermistor
J8: Malfunction of liquid thermistor

(*) See also "Check No.4 - Resistance Conversion Table (Ambient, Coil, Fin)" on page 3-107.

Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.11 "J1" Malfunction of Pressure Sensor

Remote controller display

J1

Method of malfunction detection

The malfunction is detected by the pressure measured with pressure sensor (S1NPH)

Malfunction decision conditions

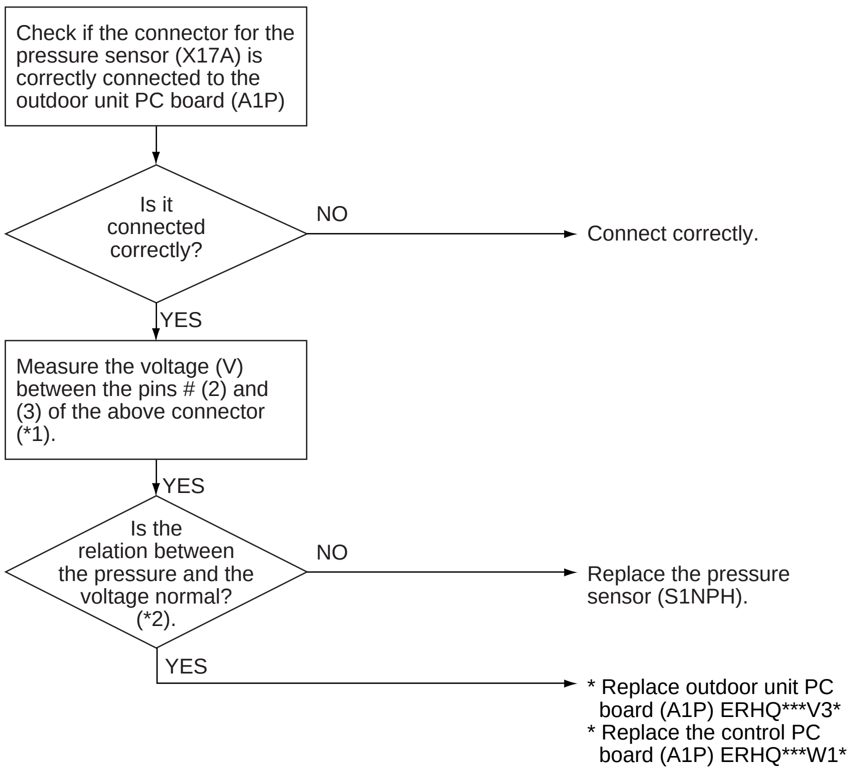
When the defect pressure becomes following:

- Detected pressure ≤-0.05MPa continues 185 sec.
- Detected pressure ≥ -0.05MPa continues 185 sec.

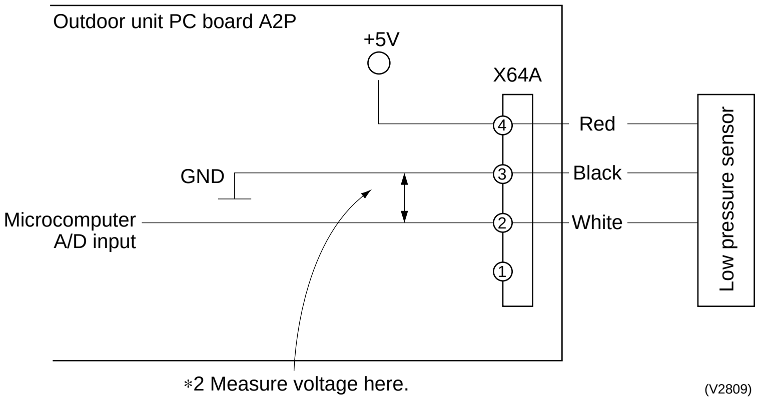
Supposed causes

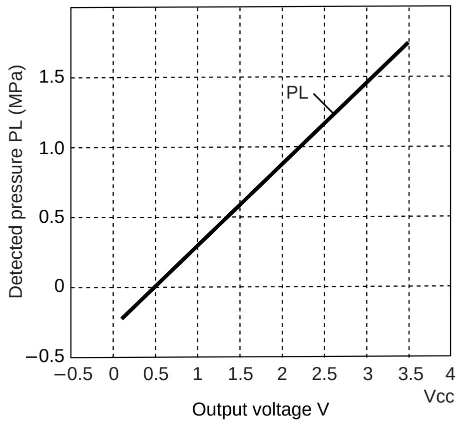
- Faulty pressure sensor
- Faulty outdoor unit PC board
- Incorrect connection of connector

Troubleshooting



Graphs





PL=0.57V−0.28
PL: detected pressure (Mpa)
V: output voltage (V)

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.12 "L1" Faulty Outdoor PC Board

Remote controller display

L1

Applicable Models

ERHQ011~016AAV3

Method of malfunction detection

- Detect malfunctions by current value during waveform output before compressor startup.
- Detect malfunctions by current sensor value during synchronized operation at the time of startup.
- Detect malfunctions using an MP-PAM series capacitor overvoltage sensor.

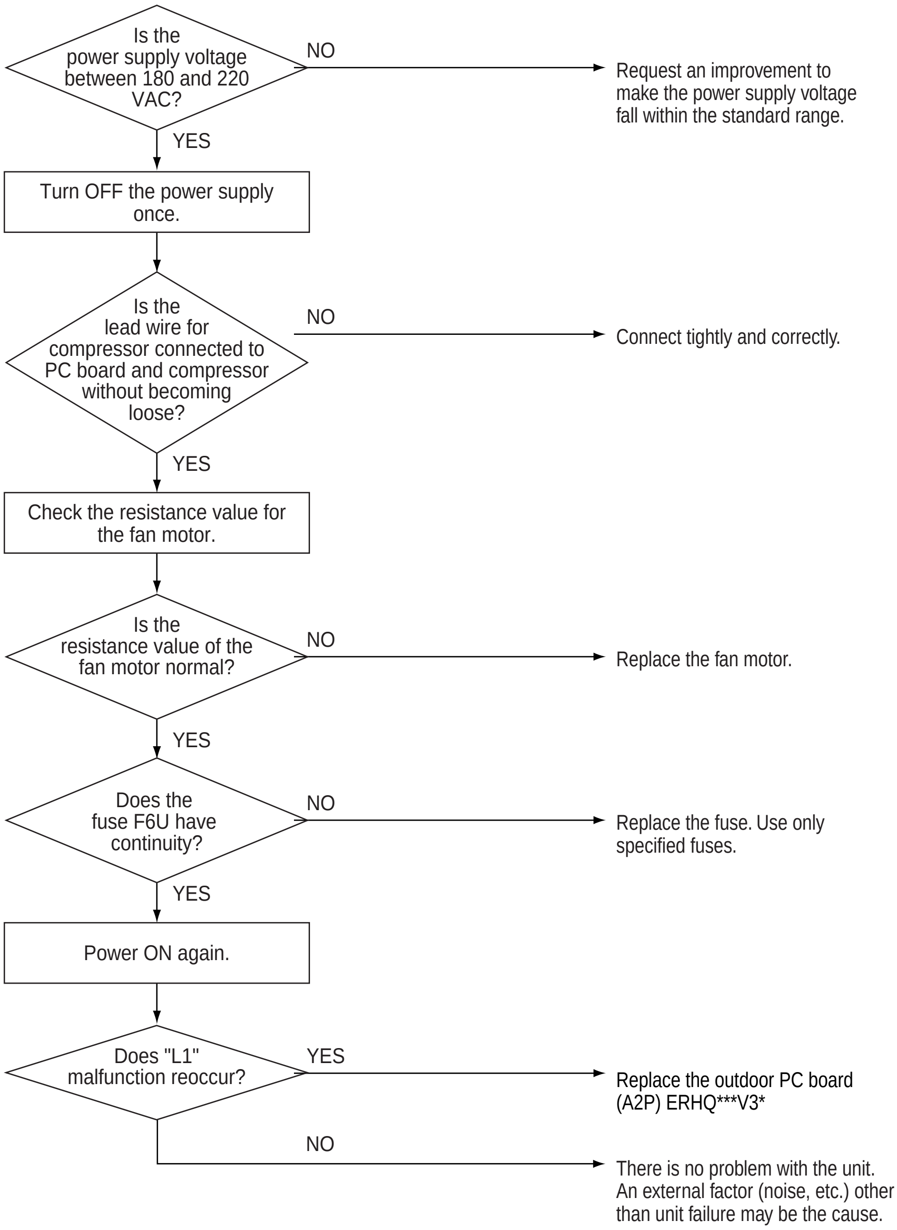
Malfunction decision conditions

- When over-current is detected at the time of waveform output before operating the compressor
- When the current sensor malfunctions during synchronized operation
- When overvoltage occurs in MP-PAM
- In case of IGBT malfunction
- In case of faulty jumper setting

Supposed causes

- Faulty outdoor PC board (A1P)
  - IPM failure
  - Current sensor failure
  - MP-PAM failure
  - Failure of IGBT or drive circuit

Troubleshooting



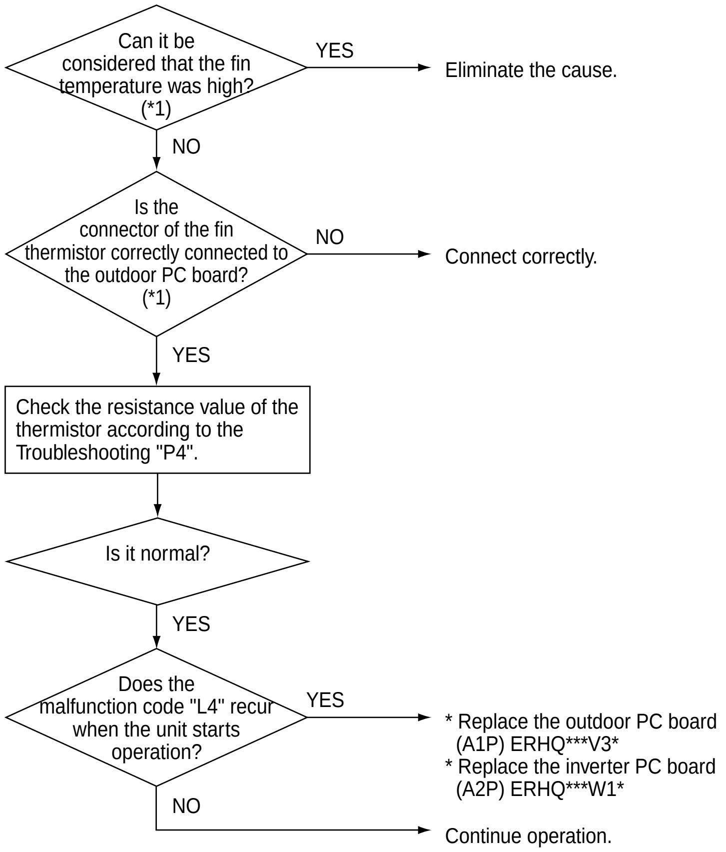
Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.13 “L4” Radiation Fin Temperature Increased

Remote controller display	L4
Method of malfunction detection	Fin temperature is detected by the thermistor of the radiation fin.
Malfunction decision conditions	When the temperature of the inverter radiation fin increases abnormally due to faulty heat dissipation.
Supposed causes	■ Activation of fin thermal switch ■ Faulty fin thermistor ■ High outside air temperature ■ Insufficient cooling of inverter radiation fin ■ Blocked suction opening ■ Dirty radiation fin ■ Faulty outdoor inverter PCB

Troubleshooting



* Fin temperature detection value

	Detection	Reset
ERHQ 011 ~ 014 ~ 016 A AV3	88°C	78°C
ERHQ 011 ~ 016 A AW1	88°C	85°C

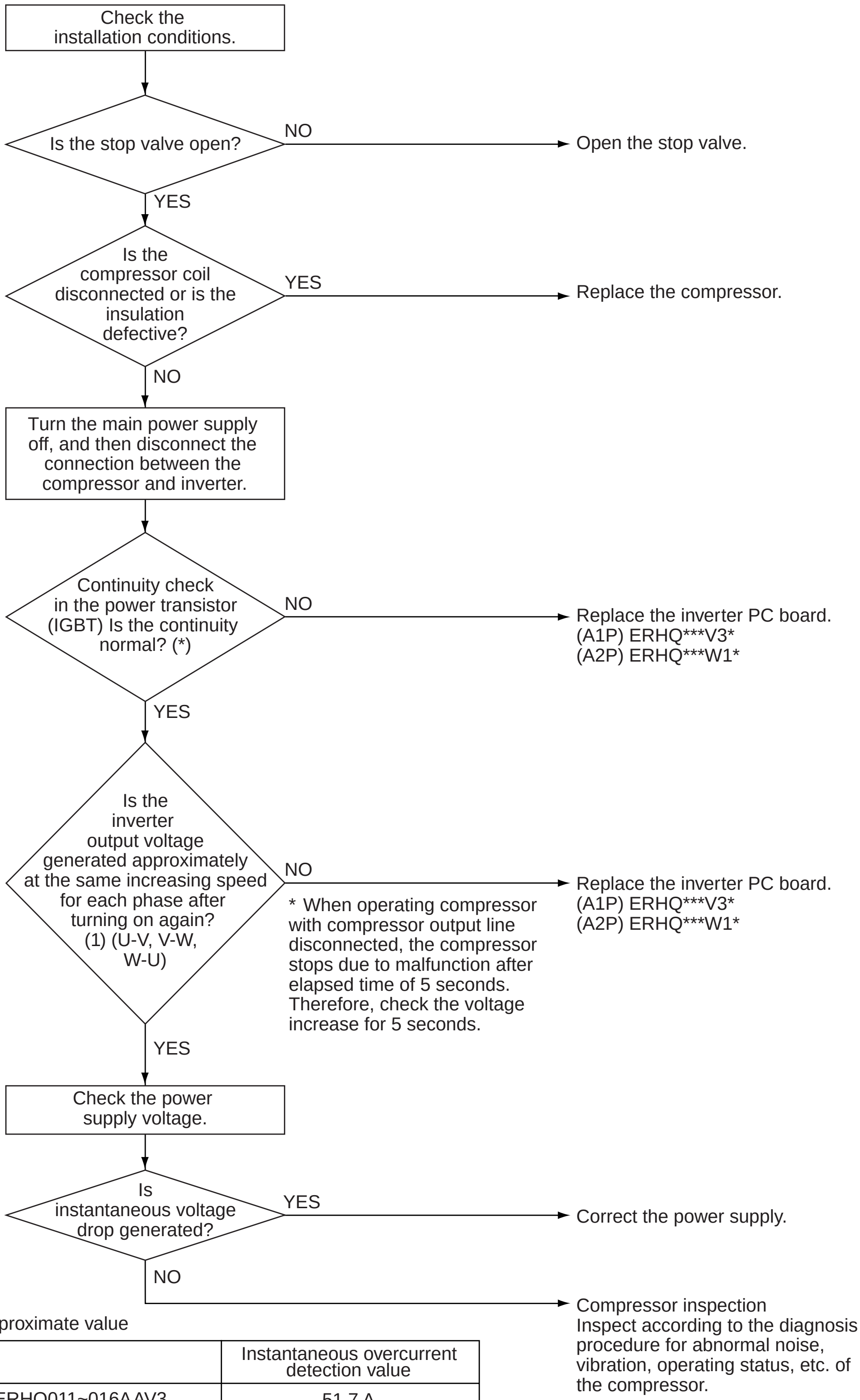
Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.14 “L5” DC Output Overcurrent (Instantaneous)

Remote controller display	L5
Method of malfunction detection	Malfunction is detected by converting the current flowing to power transistor into voltage with CT1 (DC current sensor).
Malfunction decision conditions	When overcurrent has run to power transistor. (Actuated even by instantaneous overcurrent)
Supposed causes	■ Faulty compressor coil (disconnection, poor insulation) ■ Compressor startup malfunction (mechanical lock) ■ Faulty inverter PC board ■ Instantaneous fluctuation of power supply voltage ■ Faulty compressor (if bearing is scratched) ■ The stop valve is left in closed.

Troubleshooting



(1) Approximate value

	Instantaneous overcurrent detection value
ERHQ011~016AAV3	51.7 A
ERHQ011~016AAW1	32.7 A

(*) See also "Check No.11 - Outdoor unit: Check for Power Transistor" on page 3-115.

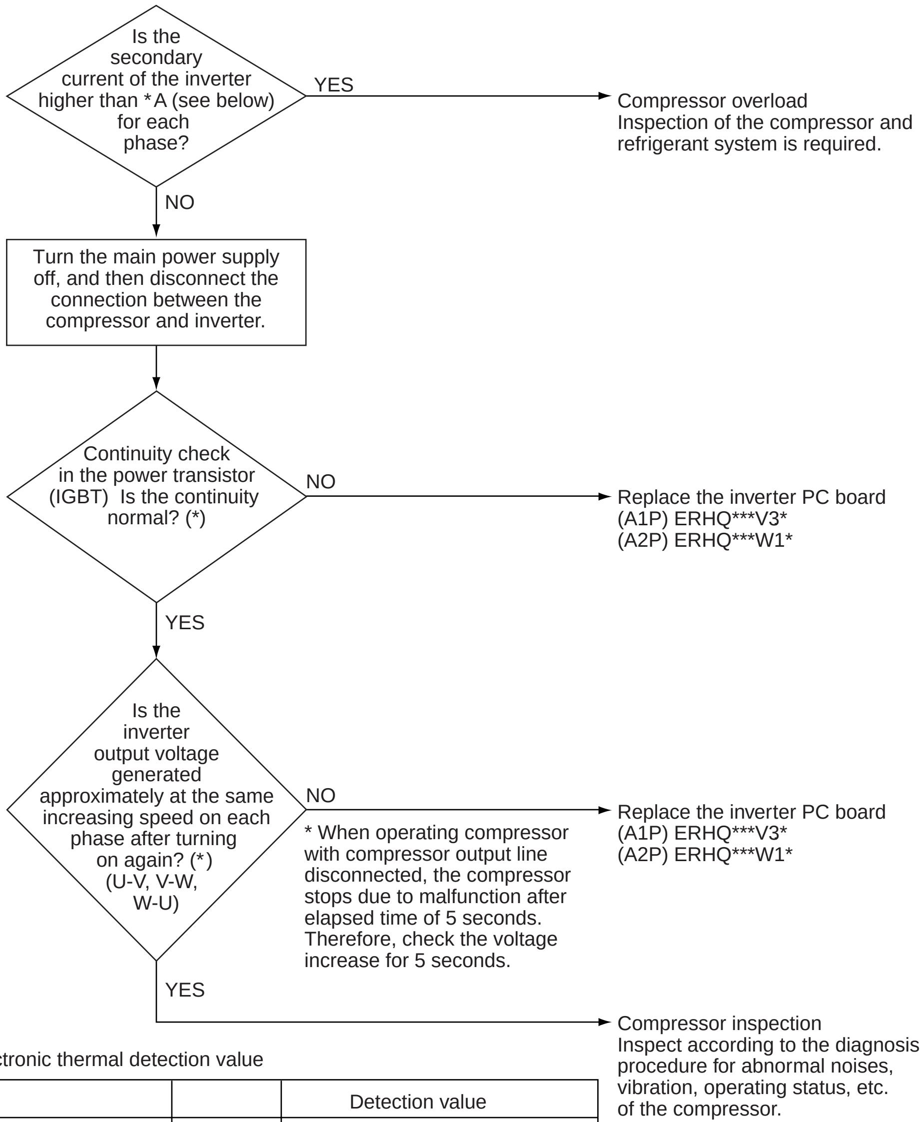
Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.15 "L8" DC Output Overcurrent (Instantaneous)

Remote controller display	L8
Method of malfunction detection	■ Malfunction is detected by converting the current flowing to power transistor into voltage with CT1 (DC current sensor). ■ Inverter PC board detects the disorder of position signal.
Malfunction decision conditions	When compressor overload (except for when startup) is detected.
Supposed causes	■ Compressor overload (during operation) ■ Disconnected compressor coil ■ Faulty inverter ■ Faulty compressor (if bearing is scratched)

Troubleshooting



* Electronic thermal detection value

		Detection value
ERHQ011~016AAV3	Cooling	31A × 5 seconds or 20.1A × 260 seconds
	Heating	
ERHQ011~016AAW1	Cooling	17A × 5 seconds or 10.6A × 260 seconds
	Heating	17A × 5 seconds or 12.6A × 260 seconds

(*) See also "Check No.11 - Outdoor unit: Check for Power Transistor" on page 3-115.

Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.16 “L9” Stall Prevention (Time Lag)

Remote controller display

L9

Method of malfunction detection

- Malfunction is detected by converting the current flowing to power transistor into voltage with CT1 (DC current sensor).
- Inverter PC board detects the disorder of position signal.

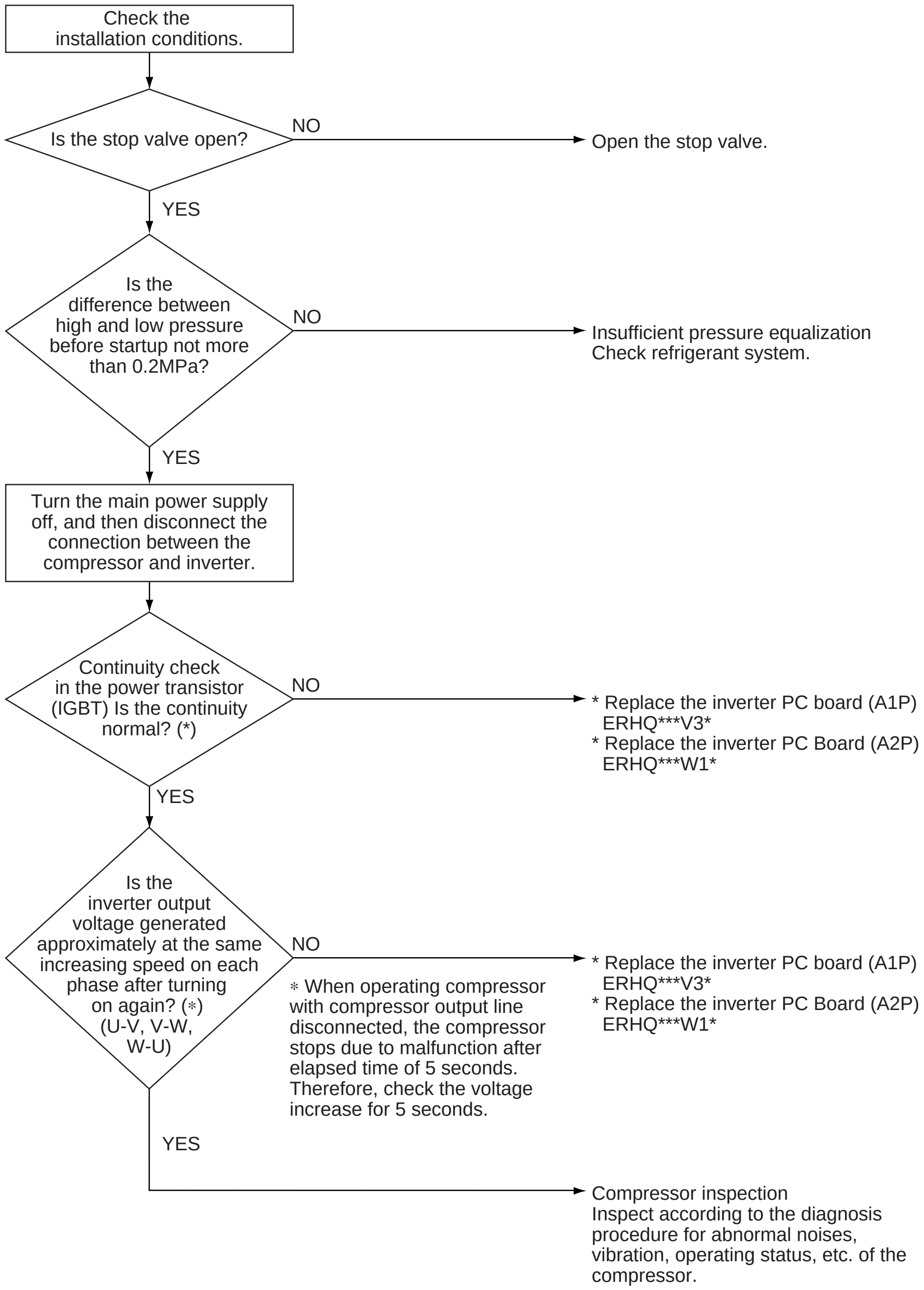
Malfunction decision conditions

- When compressor overload (except for when startup) is detected
- When position signal is disordered

Supposed causes

- Faulty compressor (lock)
- Pressure differential startup
- Faulty inverter
- The stop valve is left in closed.

Troubleshooting



(*) See also "Check No.11 - Outdoor unit: Check for Power Transistor" on page 3-115.

Caution

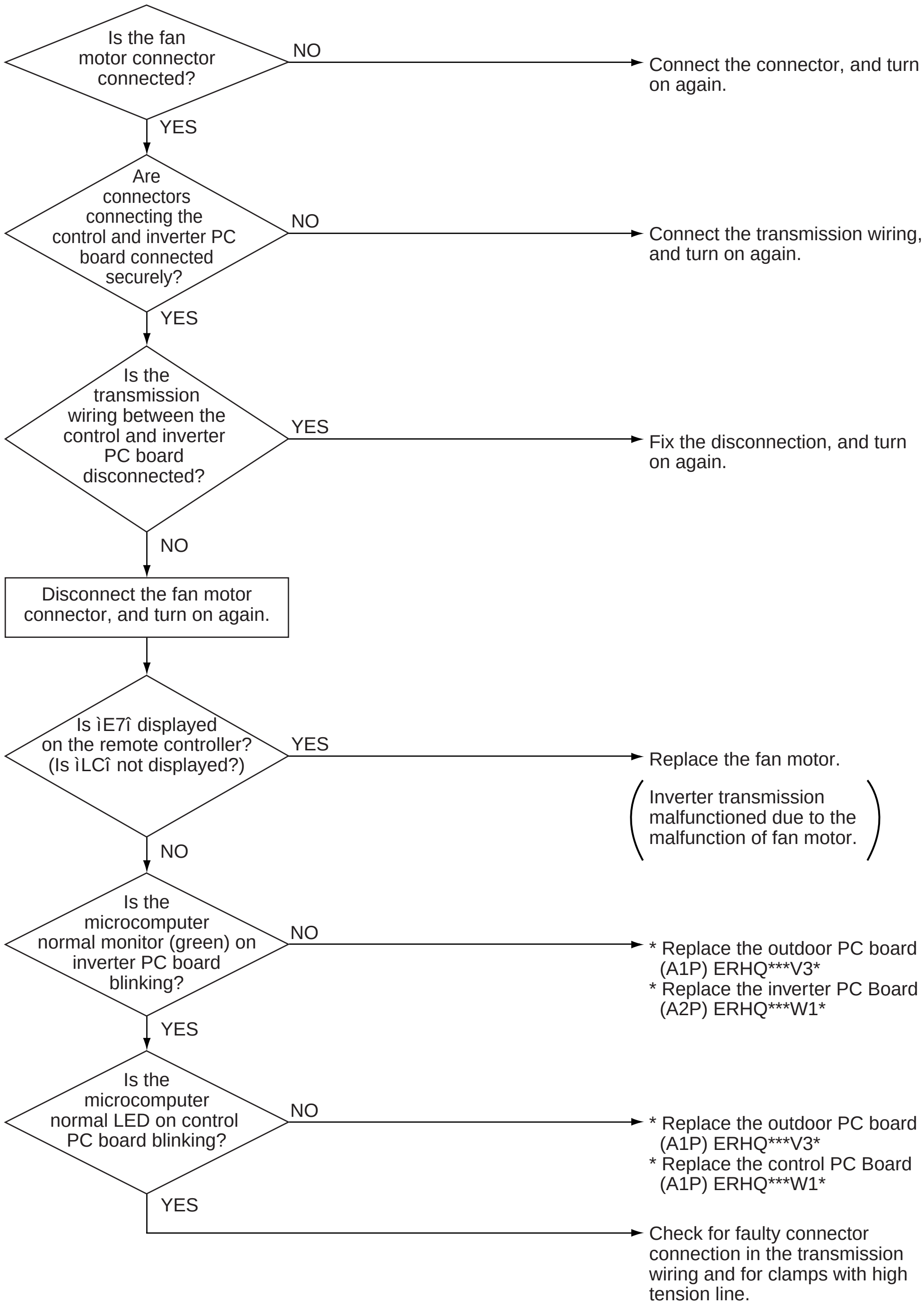
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.17 “LC” Malfunction of Transmission system (Between Control PCB and Inverter PCB)

Remote controller display	LC
Method of malfunction detection	Checks and sees whether transmission between control and inverter PC board is carried out normally.
Malfunction decision conditions	When the transmission is not carried out in a specified period of time or longer.
Supposed causes	■ Incorrect transmission wiring between control and inverter PC board/insufficient contact in wiring ■ Faulty control and inverter PC board ■ External factors (noise, etc.) ■ Faulty outdoor fan motor ■ Faulty of fan motor connector contact

3

Troubleshooting



Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.18 “P1” Open Phase or Power Supply Voltage Imbalance

Remote controller display

P1

Method of malfunction detection

Malfunction is detected according to the voltage waveform of main circuit capacitor built in inverter.

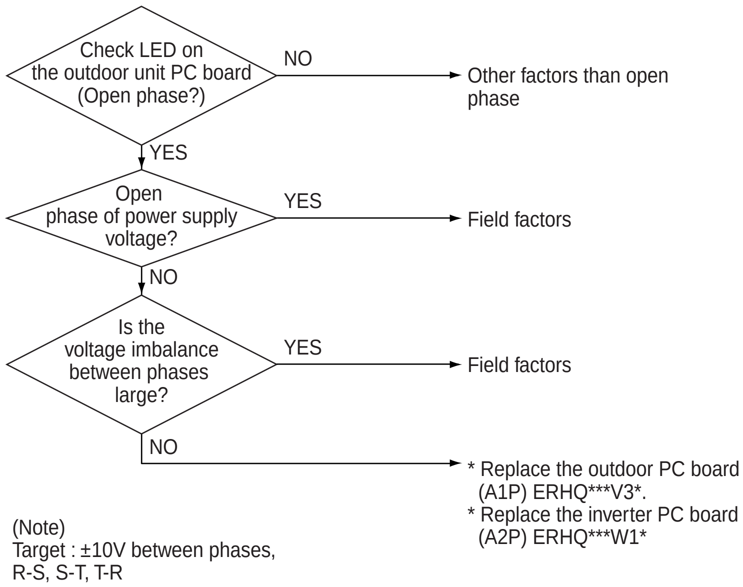
Malfunction decision conditions

When the aforementioned voltage waveform becomes identical with the waveform of the power supply open phase.

Supposed causes

- Open phase
- Voltage imbalance between phases
- Faulty outdoor inverter PC board
  - Faulty main circuit capacitor
  - Power unit (Disconnection in diode module)
  - Faulty magnetic relay (K11R, K12R)
  - Improper main circuit wiring

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.19 “P4” Malfunction of Radiator Fin Temperature Thermistor

Remote controller display

P4

Method of malfunction detection

Detection by open or short circuit of the radiator fin temperature thermistor during the compressor stops operating.

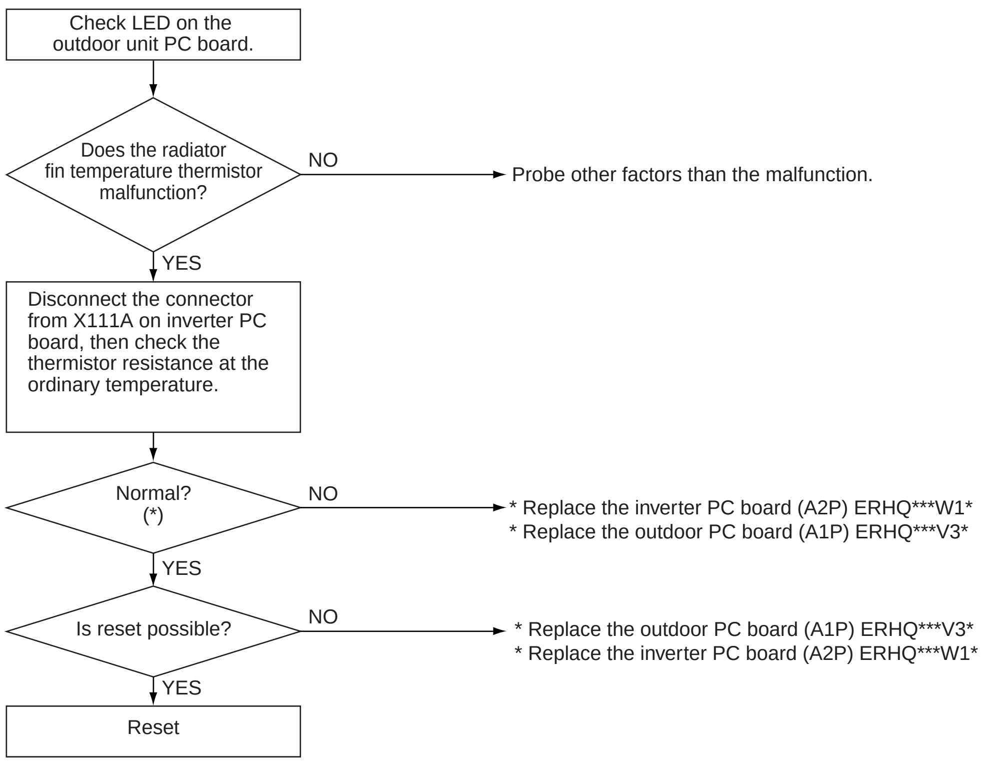
Malfunction decision conditions

When open or short circuit of the radiator fin temperature thermistor is detected during the compressor stops operating

Supposed causes

- Faulty radiator fin temperature thermistor
- Faulty outdoor unit PC board

Troubleshooting



(*) See also "Check No.4 - Resistance Conversion Table (Ambient, Coil, Fin)" on page 3-107.

Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.20 “PJ” Malfunction of Radiator Fin Temperature Thermistor

Remote controller display

PJ

Method of malfunction detection

Check whether set value written in E^2PROM (at factory) or set value of capacity setting adaptor (for replacement) is the same as outdoor unit capacity.

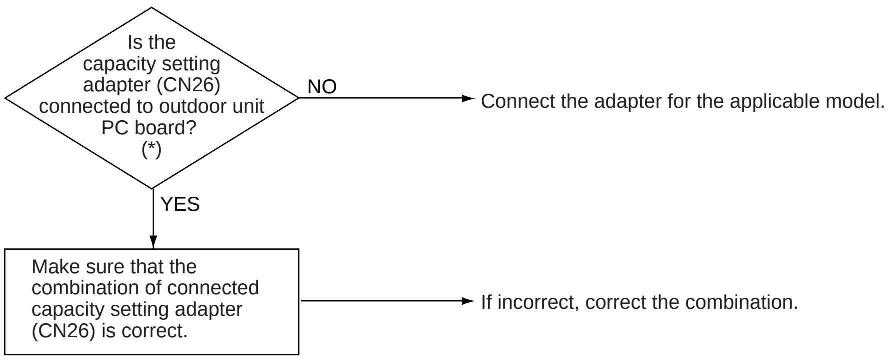
Malfunction decision conditions

When the set value on E^2PROM differs from the outdoor unit capacity or a capacity setting adaptor except for PC board applicable models is installed. (Malfunction decision is made only when turning the power supply on.)

Supposed causes

- Improper set value of E^2PROM
- Improper capacity setting adaptor
- Faulty outdoor unit PC board

Troubleshooting



(*) Capacity setting adapter is not connected at factory. (Capacity is written in E^2PROM.) Capacity setting adapter is required only when the PC board was replaced with spare PC board.

Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

4 Error Codes: System Malfunctions

4.1 What Is in This Chapter?

Introduction

In the first stage of the troubleshooting sequence, it is important to correctly interpret the error code on the remote controller display. The error code helps you to find the cause of the problem.

Overview

This chapter contains the following topics:

3

4.2 "U0" Gas Shortage (Malfunction)

Remote controller display

U0

Method of malfunction detection

(In cooling operation)
Detection based on difference in temperature between temperature preset by remote controller and indoor suction air temperature, motorized valve opening degree, compressor frequency and low pressure.

(In heating operation)
Detection based on difference in temperature between temperature preset by remote controller and indoor suction air temperature, motorized valve opening degree during the control of suction air superheating, high pressure, indoor heat exchanger temperature and indoor suction air temperature.

3

Malfunction decision conditions

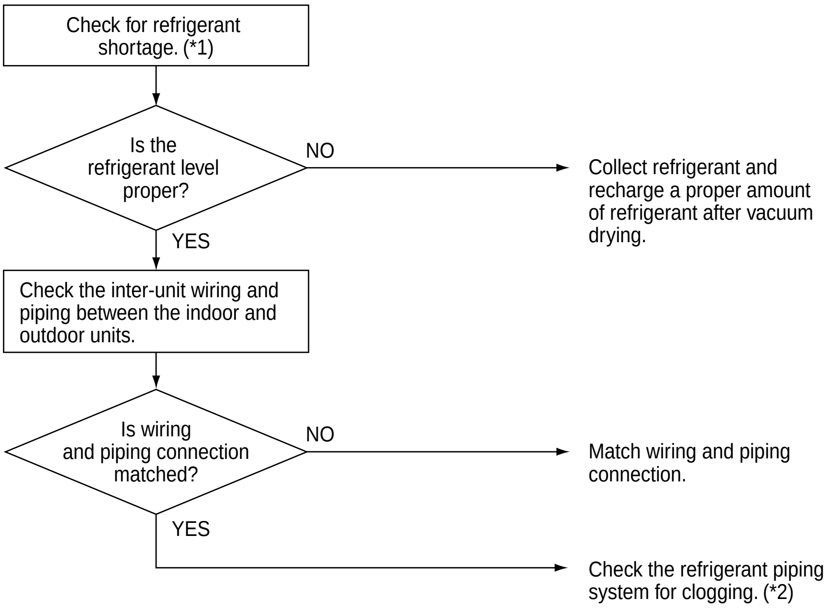
(In cooling operation)
When compressor frequency does not increase even though the load is heavy because the motorized valve is opened to the fullest extent
[If low pressure drops when the compressor is at 41Hz, malfunction is confirmed.]

(In heating operation)
When suction gas superheat degree is large, compressor frequency is low and the motorized valve is opened to the fullest extent even though heating load is heavy
[If high pressure is lower than saturated pressure for indoor heat exchanger temperature (or indoor suction air temperature), malfunction is confirmed.]

Supposed causes

- Refrigerant shortage (out of gas)
- Clogged refrigerant piping system
- Mismatching of wiring and piping

Troubleshooting



See also:

- (*1) "Check No.13 - Check for Inadequate Refrigerant" on page 3-116.
- (*2) "Check No.8 - Clogged Points" on page 3-112.

Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

4.3 "U2" Abnormal Power Supply Voltage

Remote controller display

U2

Method of malfunction detection

Malfunction is detected according to the voltage of main circuit capacitor built in the inverter and power supply voltage.

Malfunction decision conditions

When the voltage of main circuit capacitor built in the inverter and power supply voltage drop:

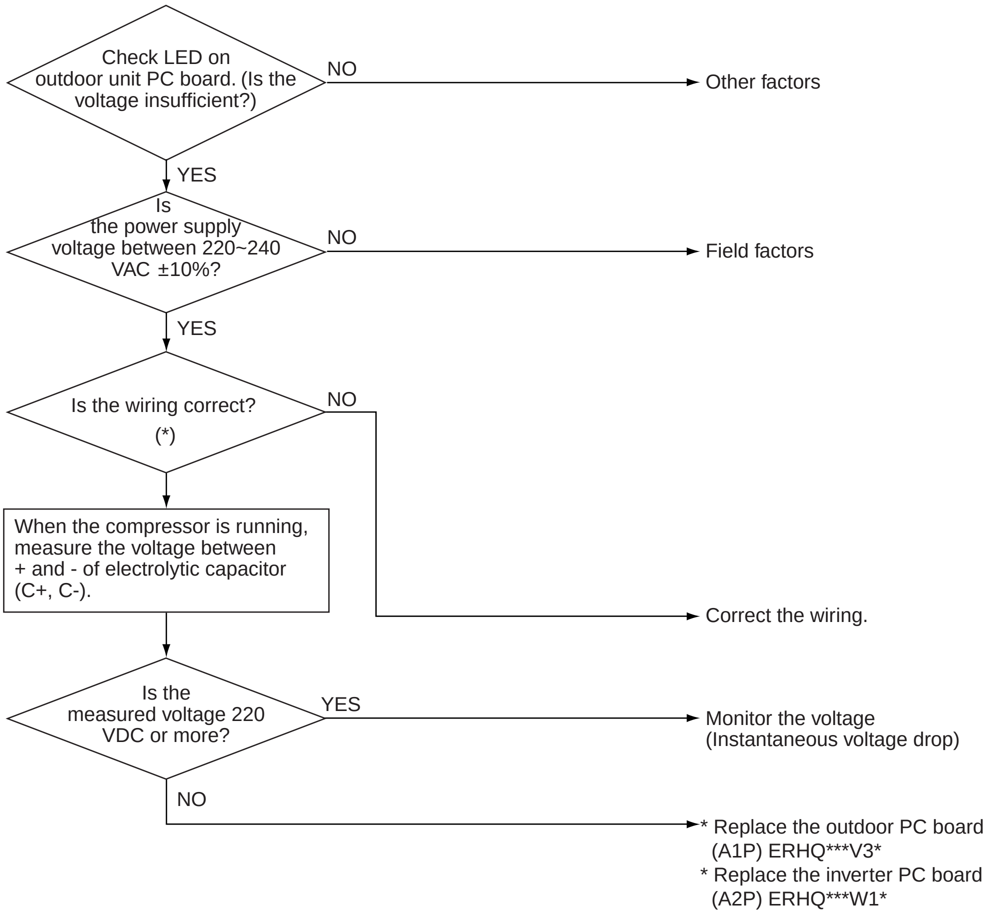
- for V3 only: 150-170 VAC or when the power failure of several tons of ms or longer is generated or DC voltage is not in range of 305~380 VDC.
- for W1 only: 300-320 VAC or when the power failure of several tons of ms or longer is generated or DC voltage is not in scope of 508~620 VDC.

* Remote controller does not decide the abnormality.

Supposed causes

- Drop in power supply voltage (180 V or less)
- Instantaneous power failure
- Inverter open phase (Phase T)
- Faulty main circuit wiring
- Faulty outdoor inverter PC board
- Main circuit parts damaged

Troubleshooting



(*) Check the several connections according to wiring diagram.

- V3/W1: Reactor coil resistance value ±0,2 ~ 1 ohm.
- V3: Capacitor C4 is correctly connected. GREY cable is connected at the side of the grey stroke on the capacitor.
- W1: Confirm the conditions of F1U & F2U.

Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

4.4 "U4", "UF" Malfunction of Transmission between Hydro-box and Outdoor Unit

Remote controller display

U4 or UF

Error generation

The error is generated when the microprocessor detects that the transmission between the indoor and the outdoor unit is not normal over a certain amount of time.

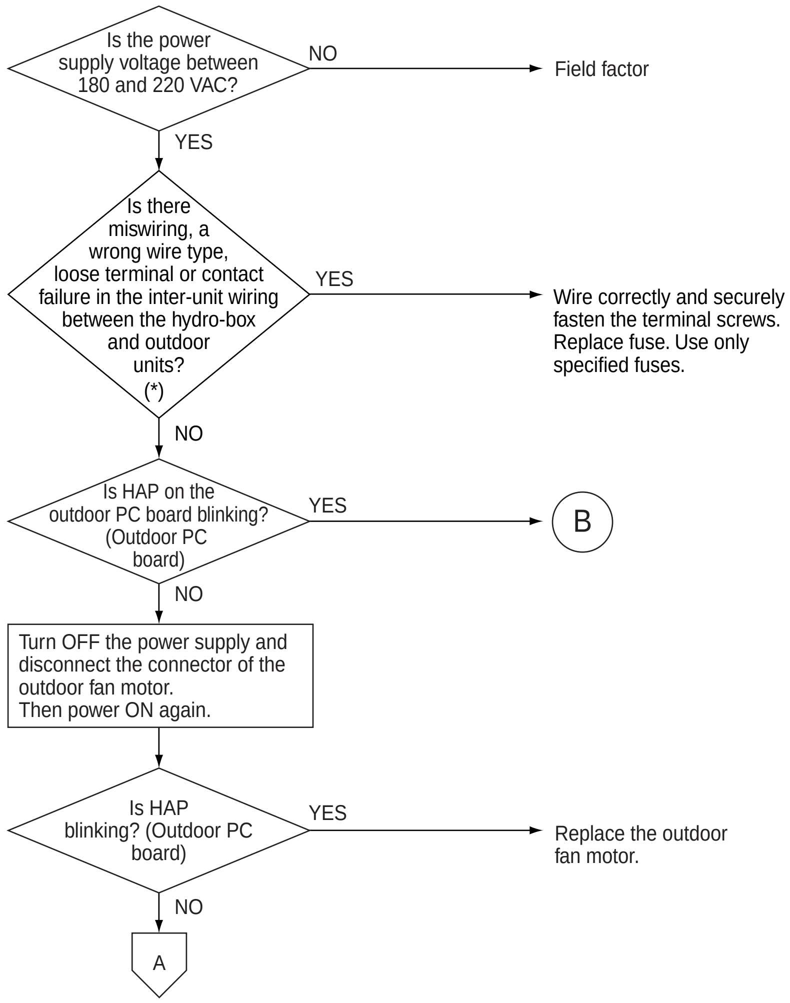
Supposed causes

The possible causes are:

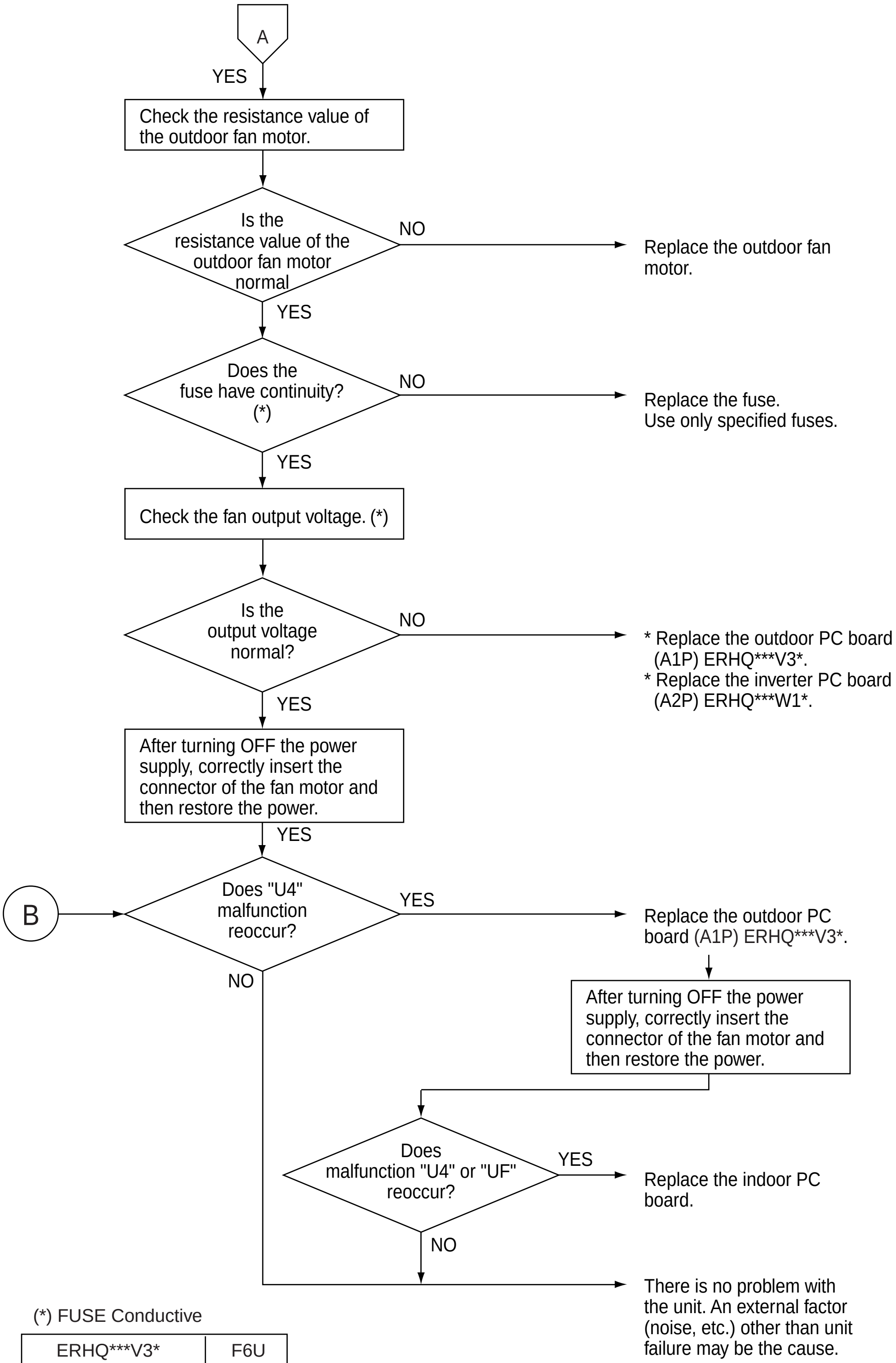
- Wiring indoor-outdoor transmission wire is incorrect
- Malfunctioning hydro-box PCB
- Malfunctioning outdoor unit PCB
- Outside cause (noise...).

Troubleshooting

Diagnosis of incorrect or broken/disconnected wiring. If the LEDs on the hydro-box PC board are off, it indicates that the transmission wiring between indoor and outdoor units may be incorrect or broken/disconnected.



(*) ERHQ***V3*
Does the fuse F3U on the communicator PC board (A4P) have No continuity?
ERHQ***W1*
Does the fuse F6U on the control PC board (A1P) have No continuity?



(*) FUSE Conductive

ERHQ***V3*	F6U
ERHQ***W1*	F7U

(*) See also "Check No.10 - Outdoor unit: Fan Speed Pulse" on page 3-114.

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

4.5 "UF" Malfunction of Transmission between Hydro-box and Outdoor Unit or Gas Shortage

Remote controller display

UF

Method of malfunction detection

Check the transmission between the indoor and outdoor units with a microcomputer when the power turned ON.

Detect by checking the following temperature differences during compressor operation.

A: Difference in temperature detected by the indoor liquid thermistor (R3T) and the indoor suction air thermistor (R1T)

B: Difference in evaporation temperature (Te) (or condensation temperature (Tc) during heating operation) detected by the indoor heat exchanger thermistor (R2T) and the compressor sensor

Malfunction decision conditions

When the inter-unit wiring between the indoor and outdoor units is incorrect

When the following conditions continue for 20 minutes during compressor operation

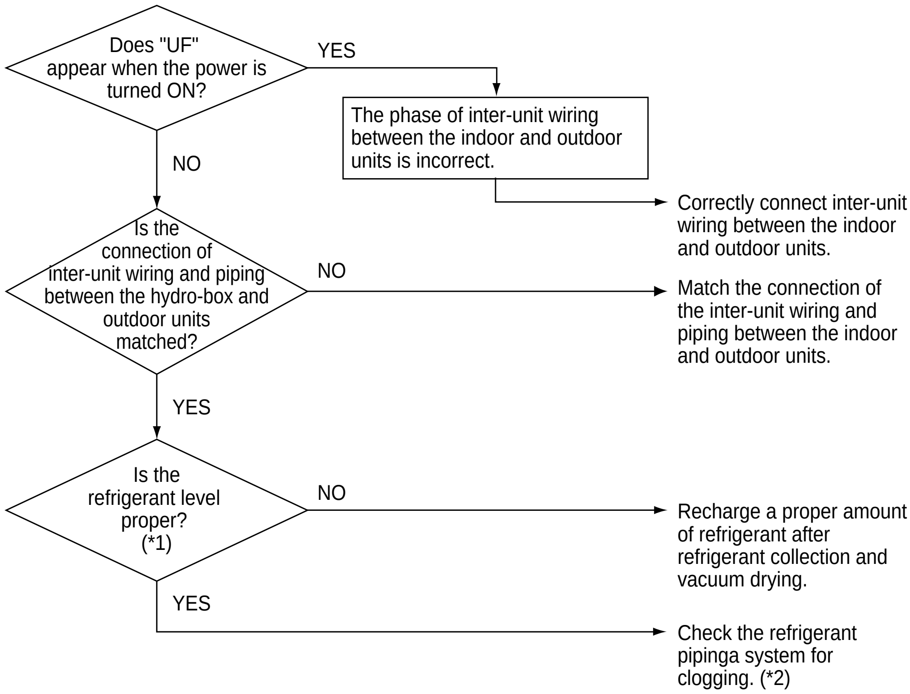
A: R2T – R1T < 4ºC, and

B: R2T – Te (or Tc during heating operation) > 14ºC (24ºC during heating operation)

Supposed causes

- Faulty inter-unit wiring between the indoor and outdoor units
- Refrigerant shortage (out of gas)
- Clogged refrigerant piping system

Troubleshooting



See also:

- (*1) "Check No.13 - Check for Inadequate Refrigerant" on page 3-116.
- (*2) "Check No.8 - Clogged Points" on page 3-112.

Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

4.6 "U5" Malfunction of Transmission between Hydro-box and Remote Controller

Remote controller display

U5

Error generation

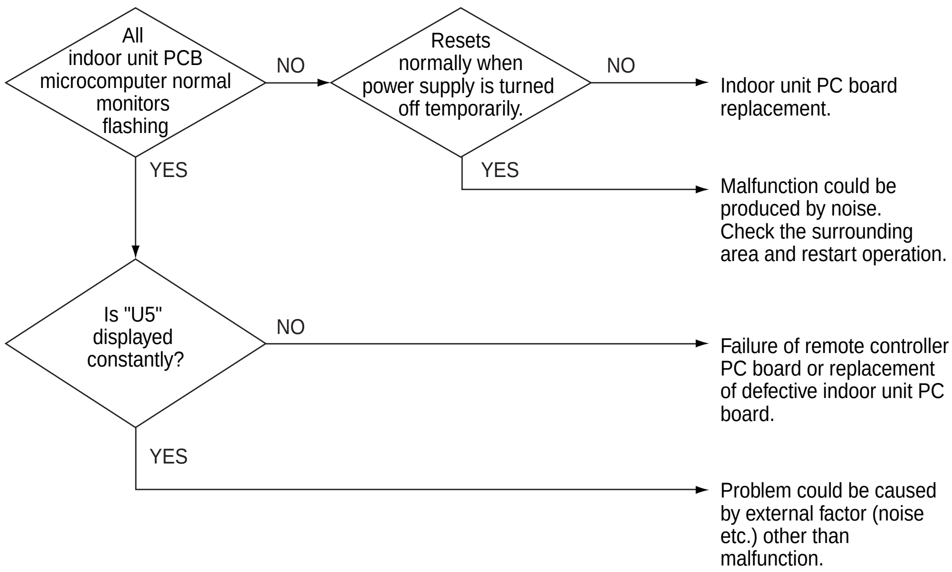
The error is generated when the microprocessor detects that the transmission between the hydro-box and the remote controller is not normal over a certain amount of time.

Supposed causes

The possible causes are:

- Malfunctioning remote controller
- Malfunctioning indoor PCB
- Outside cause (noise...)
- Connection of two master remote controllers (when using two remote controllers).

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

4.7 "UA" Malfunctioning Field Setting Switch

Remote controller display

UA

Error generation

The error is generated when incorrect combination is made. No outdoor unit connected.

Supposed causes

The possible causes are:

- Malfunctioning indoor or outdoor unit PCB
- Malfunctioning power supply PCB
- Malfunctioning remote controller wiring.
- Indoor-outdoor unit transmission wiring

3

Troubleshooting

Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

5 Additional Checks for Troubleshooting

5.1 What Is in This Chapter?

Introduction

This chapter explains how you must check the units to carry out troubleshooting correctly.

Overview

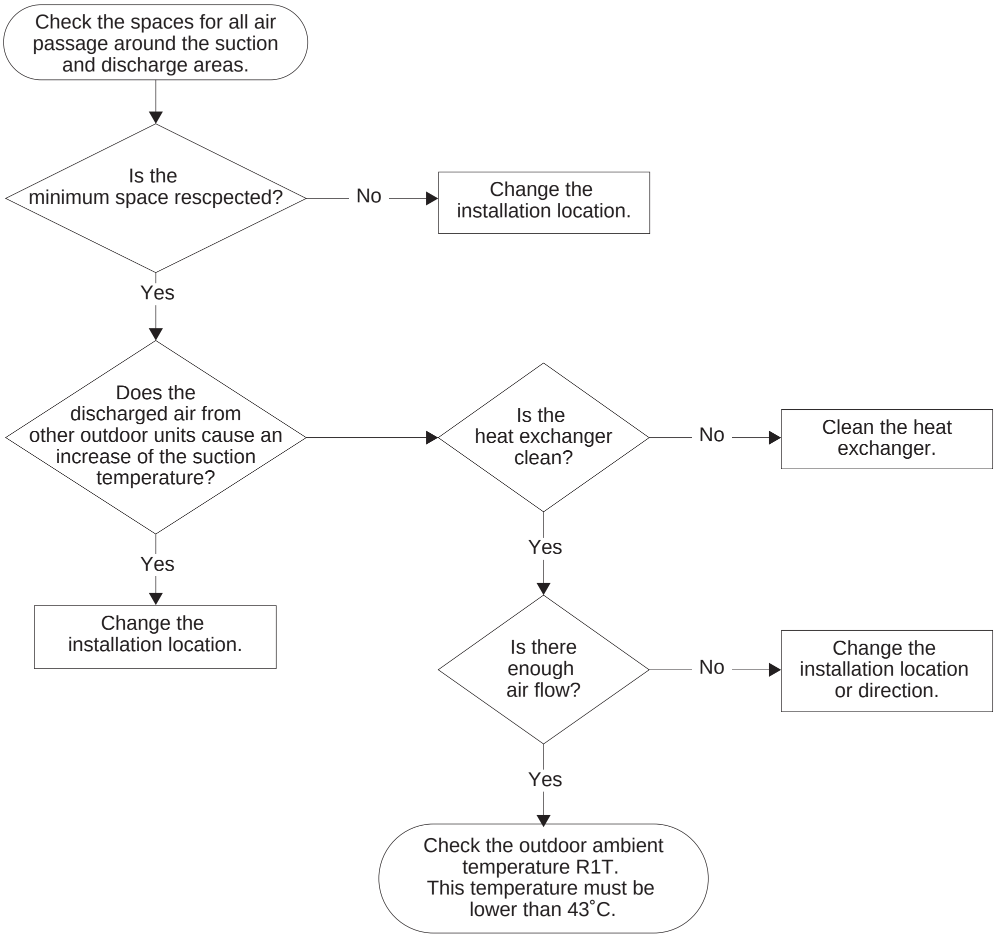
This chapter contains the following topics:

3

5.2 Check No.1 - Outdoor unit: Checking the Installation Condition

Check No.01

1 To check the installation condition, proceed as follows:



5.3 Check No.2 - Outdoor Unit: Checking the Expansion Valve

Checking

To check the electronic expansion valve, proceed as follows:

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Check if the expansion valve connector is correctly inserted in the X12A of A1P.</td></tr>
<tr><td>2</td><td>Compare the expansion valve unit with the number of the connector to make sure it is correctly connected.</td></tr>
<tr><td>3</td><td>Switch the power OFF.</td></tr>
<tr><td>4</td><td>Switch the power ON to check whether the expansion valve is producing a clicking sound.
<table>
<tr><th>If...</th><th>Then...</th></tr>
<tr><td>The expansion valve has no clicking sound</td><td>Disconnect the valve connector without the clicking sound and proceed to step 5.</td></tr>
</table>
</td></tr>
<tr><td>5</td><td>Check the coil current: Open circuit < normal < short circuit
The table below contains the reference resistance values.
<table>
<tr><th>—</th><th>White</th><th>Grey</th><th>Black</th><th>Yellow</th><th>Red</th><th>Orange</th></tr>
<tr><td>White</td><td>—</td><td>∞</td><td>45 Ω</td><td>∞</td><td>45 Ω</td><td>∞</td></tr>
<tr><td>Grey</td><td>∞</td><td>—</td><td>∞</td><td>45 Ω</td><td>∞</td><td>45 Ω</td></tr>
<tr><td>Black</td><td>45 Ω</td><td>∞</td><td>—</td><td>∞</td><td>90 Ω</td><td>∞</td></tr>
<tr><td>Yellow</td><td>∞</td><td>45 Ω</td><td>∞</td><td>—</td><td>∞</td><td>90 Ω</td></tr>
<tr><td>Red</td><td>45 Ω</td><td>∞</td><td>90 Ω</td><td>∞</td><td>—</td><td>∞</td></tr>
<tr><td>Orange</td><td>∞</td><td>45 Ω</td><td>∞</td><td>90 Ω</td><td>∞</td><td>—</td></tr>
</table>
</td></tr>
<tr><td>6</td><td>Check the clicking sound again.
<table>
<tr><th>If...</th><th>Then...</th></tr>
<tr><td>There is a clicking sound</td><td>The expansion valve works properly.</td></tr>
<tr><td>There is no clicking sound</td><td>Replace the expansion valve unit.</td></tr>
<tr><td>There is still no clicking sound</td><td>Replace outdoor PCB A1P.</td></tr>
</table>
</td></tr>
</table>

3

5.4 Check No.3 - Checking the Thermistors

Thermistors

If the cause of the problem is related to the thermistors, then the thermistors should be checked prior to changing the PCB.

For more information about these thermistors, see:

- ’Wiring Diagrams’’ (outdoor units)
- "Function of Thermistors" on page 4-4.

Overview of thermistors

The table below contains an overview of the thermistors:

Thermistor		Description
Hydro-box	R1T	Outlet water after PHR thermistor
	R2T	Outlet water after BUH thermistor
	R3T	Refrigerant liquid thermistor
	R4T	Inlet water thermistor
	R5T	Domestic hot water tank thermistor
Outdoor	R1T	Ambient air thermistor
	R2T	Discharge pipe thermistor
	R3T	Suction pipe thermistor
	R4T	Heat exchanger thermistor
	R5T	Intermediate heat exchanger thermistor
	R6T	Liquid pipe thermistor
	R10T	Power module fin thermistor ERHQ V3*
	R7T	Power module fin thermistor ERHQ W1*

Checking

To check the thermistors, proceed as follows:

Step	Action
1	Disconnect the thermistor from the PCB.
2	Read the temperature and the resistor value.
3	Check if the measured values correspond with the values in the table on the next pages.

5.5 Check No.4 - Resistance Conversion Table (Ambient, Coil, Fin)

Temperature – resistance

The table below is the thermistor (Hydro-box : Suction air, Coil / Outdoor : Ambient, Coil, Pipe without discharge, Fin) temperature – resistance conversion table.

Temp. (°C)	A (kΩ)	B (kΩ)	Temp. (°C)	A (kΩ)	B (kΩ)	Temp. (°C)	A (kΩ)	B (kΩ)
-20	197.81	192.08	20	25.01	24.45	60	4.96	4.87
-19	186.53	181.16	21	23.91	23.37	61	4.79	4.70
-18	175.97	170.94	22	22.85	22.35	62	4.62	4.54
-17	166.07	161.36	23	21.85	21.37	63	4.46	4.38
-16	156.80	152.38	24	20.90	20.45	64	4.30	4.23
-15	148.10	143.96	25	20.00	19.56	65	4.16	4.08
-14	139.94	136.05	26	19.14	18.73	66	4.01	3.94
-13	132.28	128.63	27	18.32	17.93	67	3.88	3.81
-12	125.09	121.66	28	17.54	17.17	68	3.75	3.68
-11	118.34	115.12	29	16.80	16.45	69	3.62	3.56
-10	111.99	108.96	30	16.10	15.76	70	3.50	3.44
-9	106.03	103.18	31	15.43	15.10	71	3.38	3.32
-8	100.41	97.73	32	14.79	14.48	72	3.27	3.21
-7	95.14	92.61	33	14.18	13.88	73	3.16	3.11
-6	90.17	87.79	34	13.59	13.31	74	3.06	3.01
-5	85.49	83.25	35	13.04	12.77	75	2.96	2.91
-4	81.08	78.97	36	12.51	12.25	76	2.86	2.82
-3	76.93	74.94	37	12.01	11.76	77	2.77	2.72
-2	73.01	71.14	38	11.52	11.29	78	2.68	2.64
-1	69.32	67.56	39	11.06	10.84	79	2.60	2.55
0	65.84	64.17	40	10.63	10.41	80	2.51	2.47
1	62.54	60.96	41	10.21	10.00			
2	59.43	57.94	42	9.81	9.61			
3	56.49	55.08	43	9.42	9.24			
4	53.71	52.38	44	9.06	8.88			
5	51.09	49.83	45	8.71	8.54			
6	48.61	47.42	46	8.37	8.21			
7	46.26	45.14	47	8.05	7.90			
8	44.05	42.98	48	7.75	7.60			
9	41.95	40.94	49	7.46	7.31			
10	39.96	39.01	50	7.18	7.04		—	
11	38.08	37.18	51	6.91	6.78			
12	36.30	35.45	52	6.65	6.53			
13	34.62	33.81	53	6.41	6.53			
14	33.02	32.25	54	6.65	6.53			
15	31.50	30.77	55	6.41	6.29			
16	30.06	29.37	56	6.18	6.06			
17	28.70	28.05	57	5.95	5.84			
18	27.41	26.78	58	5.74	5.43			
19	26.18	25.59	59	5.14	5.05			

Applicable sensors

A: Outdoor: Ambient, Coil, Pipe without discharge

B: Outdoor: Fin

Thermistor resistance check

Remove the connectors of the thermistors on the PCB, and measure the resistance of each thermistor using tester.

The relationship between normal temperature and resistance is shown in the graph and the table below:

	Hydro-box	**Tank thermistor**
	3SA48002	**3SA48009**
	R25°C=20kΩ	**R120=7.13Ω**
	B=3990	**B= 4177**
-20	197.8 kΩ	2534 kΩ
-15	148.2 kΩ	1877 kΩ
-10	112.0 kΩ	1404 kΩ
-5	85.52 kΩ	1059 kΩ
0	65.84 kΩ	806.5 kΩ
5	51.05 kΩ	618.9 kΩ
10	39.91 kΩ	478.8 kΩ
15	31.44 kΩ	373.1 kΩ
20	24.95 kΩ	292.9 kΩ
25	19.94 kΩ	231.4 kΩ
30	16.04 kΩ	184.1 kΩ
35	12.99 kΩ	147.4 kΩ
40	10.58 kΩ	118.7 kΩ
45	8.669 kΩ	96.13 kΩ
50	7.143 kΩ	78.29 kΩ

3

5.6 Check No.5 - Resistance Conversion Table (Discharge Pipe Sensor)

Temperature – resistance

The table below is the discharge pipe thermistor temperature – resistance conversion table.

Temp. (°C)	Resist. (kΩ)
—	—
—	—
-6.0	1120.0
-4.0	1002.5
-2.0	898.6
0.0	806.5
2.0	724.8
4.0	652.2
6.0	587.6
8.0	530.1
10.0	478.8
12.0	432.9
14.0	392.0
16.0	355.3
18.0	322.4
20.0	292.9
22.0	266.3
24.0	242.5
26.0	221.0
28.0	201.6
30.0	184.1
32.0	168.3
34.0	154.0
36.0	141.0
38.0	129.3
40.0	118.7
42.0	109.0
44.0	100.2
46.0	92.2
48.0	84.9
50.0	78.3
52.0	72.2
54.0	66.7
56.0	61.6
48.0	57.0

Temp. (°C)	Resist. (kΩ)
60.0	52.8
62.0	48.9
64.0	45.3
66.0	42.0
68.0	39.0
70.0	36.3
72.0	33.7
74.0	31.4
76.0	29.2
78.0	27.2
80.0	25.4
82.0	23.7
—	—
—	—
—	—
—	—
92.0	16.9
94.0	15.8
96.0	14.8
98.0	13.9
100.0	13.1
102.0	12.3
104.0	11.5
106.0	10.8
108.0	10.2
110.0	9.6
112.0	9.0
114.0	8.5
116.0	8.0
118.0	7.6
120.0	7.1
122.0	6.7
124.0	6.4
126.0	6.0
128.0	5.7

Temp. (°C)	Resist. (kΩ)
130.0	5.4
132.0	5.4
134.0	4.8
136.0	4.6
138.0	4.3
140.0	4.1
142.0	3.9
144.0	3.7
146.0	3.5
148.0	3.3
150.0	3.2
152.0	3.0
154.0	2.9
156.0	2.7
158.0	2.6
160.0	2.5
162.0	2.3
164.0	2.5
166.0	2.1
168.0	2.0
170.0	1.9
172.0	1.9
174.0	1.8
176.0	1.7
178.0	1.6
180.0	1.5
—	

3

5.7 Check No.6 - Evaluation of Abnormal High Pressure

Abnormally high pressure level is mostly caused by the condenser side. The following contents are provided by service engineer based on their field checks. Further, the number is listed in the order of degree of influence.

In cooling operation

Check items (Possible causes)	Judgment
Does the outdoor unit fan run normally?	Visual inspection
Is the outdoor unit heat exchanger clogged?	Visual inspection
Is there clogging before or after the EV (capillary)?	Check if there is a temperature difference before and after EV (capillary). Check if the main valve unit of EV operates (by noise, vibration).
Is the check valve clogged? *Heat pump model only	Check if there is a temperature difference before and after check valve. →If YES, the check valve is caught.
Is the HPS normal?	Check continuity by using a tester.
Is the outdoor unit installed under such conditions that short circuit easily occurs?	Visual inspection
Is the piping length 5 meters or less?	Visual inspection
Does air enter the refrigerant system?	Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant.
Is the refrigerant overcharged?	Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant.

In heating operation

Check items (Possible causes)	Judgment
Is the hydro-box heat exchanger clogged?	Visual inspection
Is there clogging before or after the EV (capillary)?	Check if there is a temperature difference before and after EV (capillary). Check if the main valve unit of EV operates (by noise, vibration).
Is the check valve clogged?	Check if there is a temperature difference before and after check valve. →If YES, the check valve is caught.
Is the HPS normal?	Check continuity using a tester.
Is the piping length 5 meters or less?	Visual inspection
Does air enter the refrigerant system?	Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant.
Is the refrigerant overcharged?	Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant.

5.8 Check No.7 - Evaluation of Abnormal Low Pressure

Abnormally low pressure level is mostly caused by the evaporator side. The following contents are provided based on field checking of service engineer. Further, the number is listed in the order of degree of influence.

In cooling operation

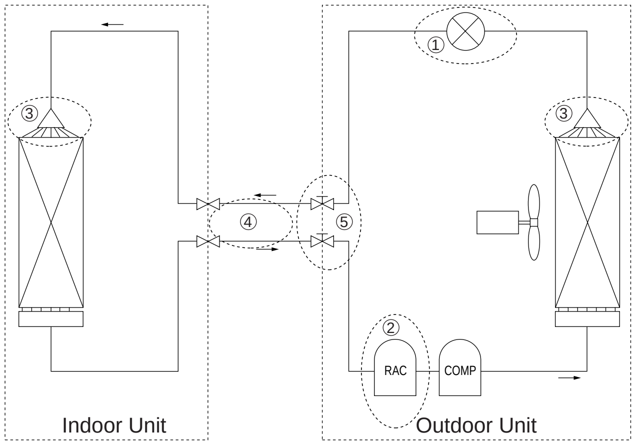
Check items (Possible causes)	Judgment
Does the outdoor unit fan run normally?	Visual inspection
Is the hydro-box filter clogged?	Visual inspection
Is there clogging before or after the EV (capillary)?	Check if there is a temperature difference before and after EV (capillary). Check if the main valve unit of EV operates (by noise, vibration).
Is the check valve clogged? *Heat pump model only	Check if there is a temperature difference before and after check valve. →If YES, the check valve is caught.
Is the LPS normal?	Check continuity using a tester.
Is the hydro-box installed under such conditions that short circuit easily occurs?	Visual inspection
Is the refrigerant gas short?	Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant.

In heating operation

Check items (Possible causes)	Judgment
Does the outdoor unit fan run normally?	Visual inspection
Is the outdoor unit heat exchanger clogged?	Visual inspection
Is the outdoor unit installed under such conditions that short circuit easily occurs?	Visual inspection
Is there clogging before or after the EV (capillary)?	Check if there is a temperature difference before and after EV (capillary). Check if the main valve unit of EV operates (by noise, vibration).
Is the check valve clogged?	Check if there is a temperature difference before and after check valve. →If YES, the check valve is caught.
Is the LPS normal?	Check continuity using a tester.
Is the refrigerant gas short?	Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant.

5.9 Check No.8 - Clogged Points

Temperature differences must occur before or after the clogged points!

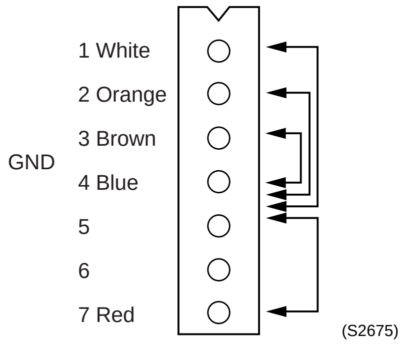


Check points		Check factor	Causes	Remedies
1	Around expansion mechanism	Temperature difference	■ Dust ■ Choked moisture ■ Reduced effective pipe diameter due to adherent contamination, etc.	Replace the expansion valve.
2	Accumulator	Frosting	■ Choked moisture	Blow a nitrogen gas, and then replace the refrigerant.
3	Distributor	Temperature difference	■ Dust ■ Choked moisture ■ Reduced effective pipe diameter due to adherent contamination, etc.	Replace the heat exchanger or distributor.
4	Field piping	Temperature difference	■ Collapsed pipe	Replace the pipe.
5	Stop valve	Temperature difference	■ The stop valve is not fully open.	Open the stop valve fully.

5.10 Check No.9 - Outdoor Unit: Fan Motor Signal Line

1 Turn the power supply off.

2 With the fan motor connector disconnected, measure the resistance between each pin, then make sure that the resistance is more than the value mentioned in the following table.



Measurement point	Judgment
1 - 4	1MΩ or more
2 - 4	100kΩ or more
3 - 4	100Ω or more
4 - 7	100kΩ or more

3

5.11 Check No.10 - Outdoor unit: Fan Speed Pulse

1 Disconnect the connector X106A with the power supply OFF and Operation OFF.

2 Is the voltage between pins 4 and 3 of X106A about 15 VDC after turning the power supply on?

3 Is the voltage between pins 4 and 1 of X106A about 5 VDC?

4 Connect the connector X106A with the power supply OFF and Operation OFF.

5 When making one turn of the upper fan motor by hand after turning the power supply on, is a pulse (0 and 5 V) generated 4 times between pins 4 and 1 of X106A? (Measure at the contact terminal on the harness side with the connector connected.)

6 Disconnect the connector X107A with the power supply OFF and Operation OFF.

7 Is the voltage between pins 4 and 3 of X107A about 15 VDC after turning the power supply on?

8 Is the voltage between pins 4 and 1 of X107A about 5 VDC?

9 Connect the connector X107A with the power supply OFF and Operation OFF.

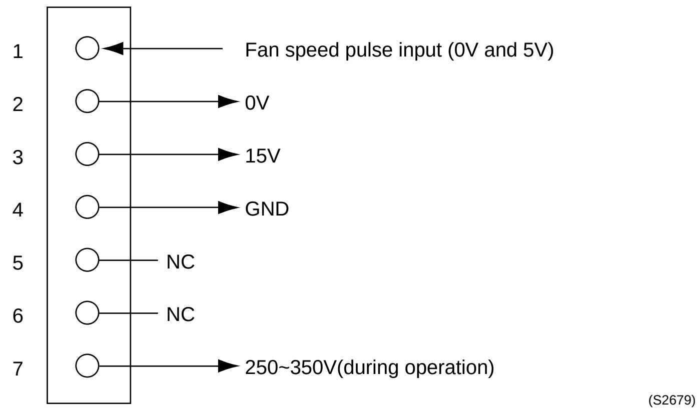
10 When making one turn of the lower fan motor by hand after turning the power supply on, is a pulse (0 and 5 V) generated 4 times between pins 4 and 1 of X107A?

(2) (7): NO →Faulty PC board →Replace the PC board.

(3) (8): NO →Faulty PC board →Replace the PC board.

(5)(10): NO →Faulty hall IC →Replace the DC fan motor.

(2) (3) (5) (7) (8) (10): YES →Replace the PC board.



5.12 Check No.11 - Outdoor unit: Check for Power Transistor

Judgment according to the continuity check by using an analog tester:

1 Do not touch the charged area (high voltage) for 10 minutes after turning the power supply off.

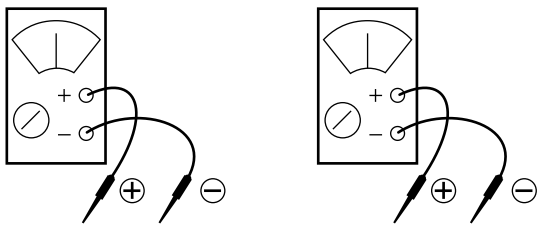
2 If you must touch such an area, make sure that the power supply voltage of power transistor is 50 V or less.

3 Disconnect the connector of the outdoor unit fan motor.
When the outdoor unit fan is rotating against a strong wind, the condenser is charged and electric shock may result. Therefore, disconnect the connector from the outdoor unit fan motor after confirming that the outdoor unit fan has stopped.

4 Before measuring the continuity, disconnect the connection between compressor and power transistor.

5 Measure the continuity in the following procedure.
[Judgment] Normal if the continuity check results in the following.

Power transistor (on inverter PC board)



P — U	Continuity	*	U — P	∞	
P — V	Continuity	*	V — P	∞	
P — W	Continuity	*	W — P	∞	
U — P	∞		P — U	Continuity	*
V — P	∞		P — V	Continuity	*
W — P	∞		P — W	Continuity	*

(S2678)

* If there is continuity, the resistance should be the same as each phase.

* If a digital tester is used for the measurement of continuity, ∞and continuity may be reversed.

3

5.13 Check No.13 - Check for Inadequate Refrigerant

As criteria for judging whether refrigerant is inadequate or not, refer to the following operating conditions.

<Diagnosis of inadequate refrigerant>
In cooling operation

1 As suction superheat degree increases due to gas shortage, the electronic expansion valve tends to open (opens fully) in order to avoid overheat operation.

2 In response to decreased evaporator capacity caused by gas shortage, capacity is controlled in the inverter in order to maintain low pressure, which results in a decrease in frequency.

3 Because of (1) and (2) above, the compressor frequency decreases despite a large difference (large load) between temperature set by the remote controller and indoor suction temperature, resulting that cooling capacity becomes unavailable.

4 If gas shortage worsens, the electronic expansion valve remains fully open and suction superheat degree further increases. In addition, because the compressor frequency drops to the level of the lowest frequency (52 Hz) and the refrigerant flow rate decrease, low pressure cannot be maintained.

<Diagnosis of inadequate refrigerant>

In heating operation

1 As suction superheat degree increases due to gas shortage, the electronic expansion valve tends to open (opens fully) to avoid overheat operation.

2 As suction superheat degree increases due to gas shortage, compressor frequency decreases because suction superheat degree is controlled in order to prevent oil to the outdoor heat exchanger from being retained.

3 Because of (1) and (2) above, evaporator capacity and compressor frequency decrease despite a large difference (large load) between temperature set by the remote controller and indoor suction temperature, resulting that high pressure cannot be maintained and heating capacity becomes unavailable. Also a decrease in evaporator capacity frequently puts the system in defrost operation.

4 If gas shortage worsens, high pressure becomes smaller than saturated pressure equivalent to indoor heat exchanger temperature (or indoor suction temperature).

5.14 Check No.14 - Check for Excessive Refrigerant Charging

As criteria for judging whether refrigerant is excessively charged or not, refer to the following operating conditions.

<Diagnosis of excessive refrigerant charging>
In cooling operation

1 Because high pressure rises due to excessive charging, overload control is carried out and capacity tends to run short.

2 Considering pressure load, compressor discharge pipe temperature is low.

3 Subcooled degree of condensate liquid becomes large. Therefore, temperature of blown air passing through subcooled part decreases in heating operation.

5.15 Check No.15 - Check for Factors Causing Wet Operation

Referring to the Fault Tree Analysis (FTA) shown below, identify the faulty points.

Note

Reference values for supreheat degree to be used in the judgement of wet operation :

1 Suction pipe superheat degree: 4°C or more

2 Discharge pipe superheat degree: 5°C or less

(The values above must be used only for reference purposes. Even it is operated within the range above, operation may be normal in other conditions)

3

Part 4
Commissioning and Test Run

What is in this part?

This part contains the following chapters:

4

1 Pre-Test Run Checks

1.1 What Is in This Chapter?

Introduction

This chapter contains the following information:

- Checks before test run
- Test run checks

Overview

This chapter contains the following topics:

4

1.2 Checks before Test Run

Introduction

This chapter will show an overview of all checks before test run.

Content

4

1.2.1 General procedure

Before carrying out a test run, proceed as follows:

Step	Action
1	Make sure the voltage at the primary side of the safety breaker is: ■ 230 V ± 10% for 1-phase units ■ 400 V ± 10% for 3-phase units
2	Fully open the liquid and the gas stop valve.

1.2.2 Initial Start-up at Low Outdoor Ambient Temperatures

Unit *with* optional backup heater

During initial start-up or after a long period of standstill, and when water temperature is low, it is important that the water is heated gradually. Failure to do so may result in cracking of concrete floors due to rapid temperature change.

To do so, the lowest leaving water set temperature can be decreased to a value between 15°C and 25°C by adjusting the field setting [9-01] "heating set point lower limit". Refer to ‘‘Field settings” on page 4-9

Note

Heating between 15°C and 25°C is performed by the backup heater only. This feature is not available on units without a backup heater.

1.2.3 Checks before Initial Start-up

Warning!

Check off the power supply before making any connections.

Procedure

After the installation of the unit, check the following before switching on the circuit breaker:

1 Field wiring

Make sure that the field wiring between local supply panel and hydro-box, outdoor unit and hydro-box, hydro-box and valves (when applicable), hydro-box and room thermostat (when applicable), and hydro-box and domestic hot water tank has been carried out according to the instructions described in the chapter ‘‘Field settings” on page 4-9, according to the wiring diagrams and according to European and national regulations.

2 Fuses or protection devices

Check that the fuses or the locally installed protection devices are of the size and type specified in the chapter "Technical specifications" on page 27. Make sure that neither a fuse nor a protection device has been bypassed.

3 Booster heater circuit breaker F2B

Do not forget to turn on the booster heater circuit breaker F2B in the switch box (applies only to units with optional domestic hot water tank installed).

4 Earth wiring

Make sure that the earth wires have been connected properly and that the earth terminals are tightened.

5 Internal wiring

Visually check the switch box on loose connections or damaged electrical components.

6 Fixation

Check that the unit is properly fixed, to avoid abnormal noises and vibrations when starting up the unit.

7 Damaged equipment

Check the inside of the unit on damaged components or squeezed pipes.

8 Refrigerant leak

Check the inside of the unit on refrigerant leakage. If there is a refrigerant leak, call your local Daikin dealer.

9 Power supply voltage

Check the power supply voltage on the local supply panel. The voltage must correspond to the voltage on the identification label of the unit.

10 Air purge valve

Make sure the air purge valve is open (at least 2 turns).

11 Pressure relief valve

Check if the backup heater vessel is completely filled with water by operating the pressure relief valve. It should purge water instead of air (applies only to units with optional backup heater installed).

Caution! Operating the system with the backup heater vessel not completeley filled with water will damage the backup heater!

12 Shut-off valves

Make sure that the shut-off valves are correctly installed and fully open.

Caution! Operating the system with closed valves will damage the pump!

1.2.4 Powering up the Hydro-box

When power supply to the hydro-box is turned on, "88" is displayed on the user interface during its initialisation, which might take up to 30 seconds. During this process the user interface cannot be operated.

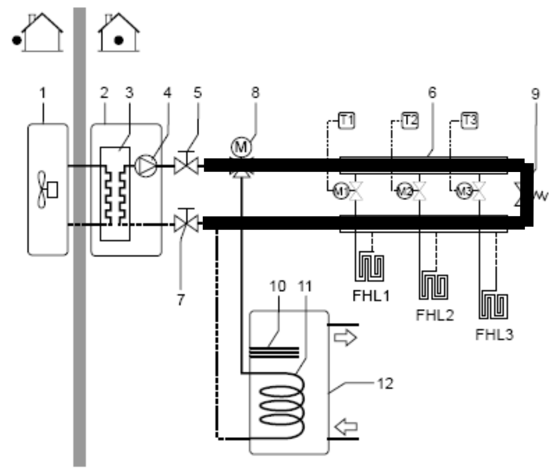
1.2.5 MINIMUM water volume in the installation

In order to secure the correct operation of the heat pump in all conditions, the minimum water volume in the installation should be 20l (°).

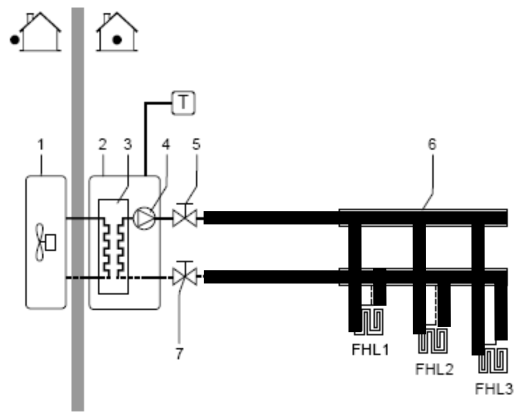
Caution!

The minimum water volume of the system is the available water volume in the most critical situation.

- The most critical situation in this type of installation is in case all valve are closed. Available water volume is only field piping volume.



- In this type of installation, the minimum water volume is equal to the total system water volume.



(°): The minimum water volume of 20l is excluding the internal water volume of hydrobox.

1.3 Test Run Operation (Manual)

Procedure

If required, the installer can perform a manual test run operation at any time to check correct operation of cooling, heating and domestic water heating.

1. Push the button 4 times so the t icon will be displayed.
2. Depending on the hydro-box model, heating operation, cooling operation or both must be tested as follows (when no action is performed, the user interface will return to normal mode after 10 seconds or by pressing the z button once):
   - To test the heating operation push the / button so the h icon is displayed. To start the test run operation press the button.
   - To test the cooling operation push the / button so the icon is displayed. To start the test run operation press the button.
   - To test the domestic operation push the button. The test run operation will start without pressing the button.
3. The test run operation will end automatically after 30 minutes or when reaching the set temperature. The test run operation can be stopped manually by pressing the button once. If there are misconnections or malfunctions, an error code will be displayed on the user interface. Otherwise, the user interface will return to normal operation.
4. To resolve the error codes, see “Part 3–Troubleshooting”.

Notes

- To display the last resolved error code, push the button 1 time. Push the button again 4 times to return to normal mode.
- It is not possible to test run if a forced operation from the outdoor unit is in progress. Should forced operation be started during a test run, the test run will be aborted.

4

2 Field settings

2.1 What Is in This Chapter?

Introduction

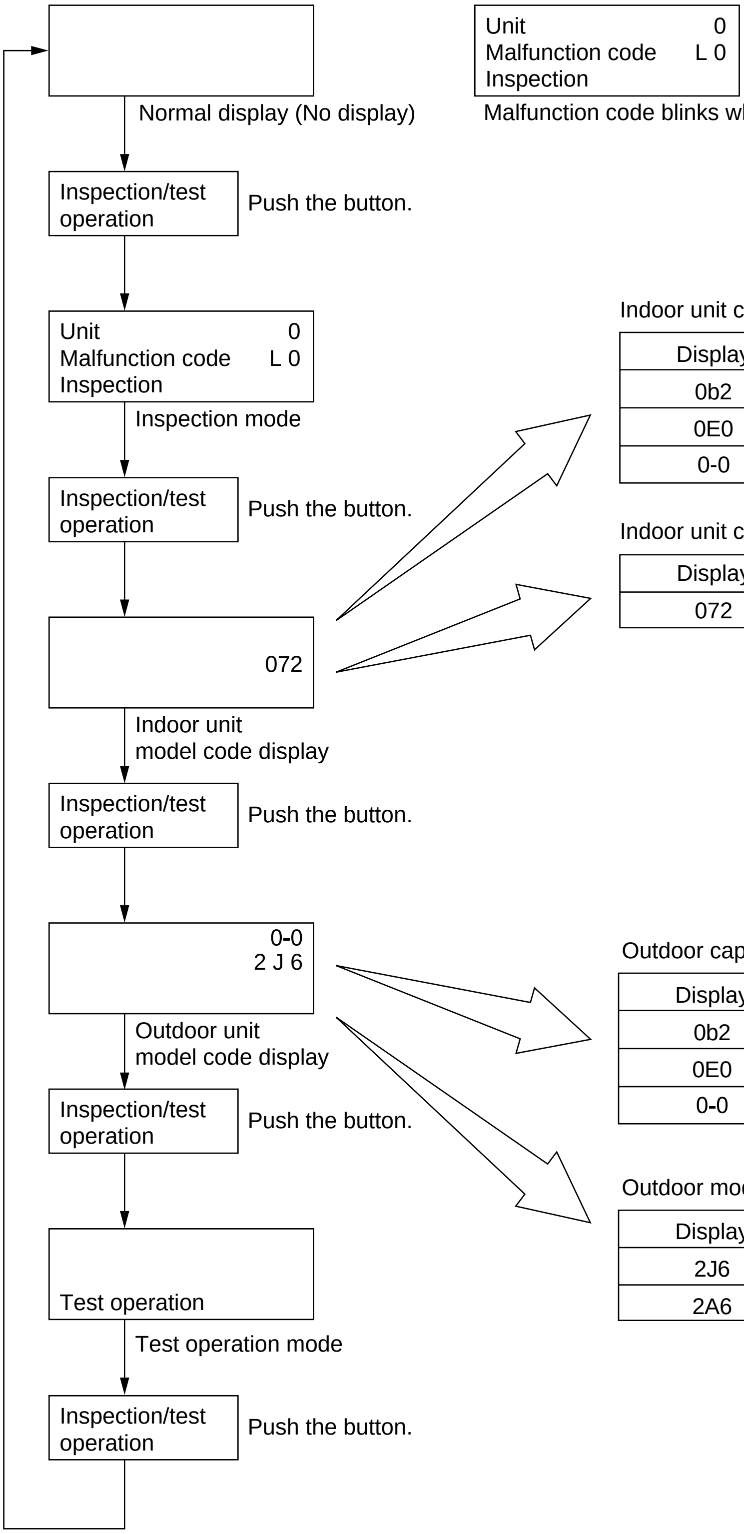
This chapter contains the following information:

- How to change the field settings
- Overview of the field settings
- Field settings by Dip Switches

Overview

This chapter contains the following topics:

2.2 Operation of the User interface Inspection / Test Operation Button



Indoor unit capacity code

Display	Capacity classification
0b2	011
0E0	014
0-0	016

Indoor unit code

Display	System classification
072	Hydro - box ALTHERMA

Outdoor capacity code

Display	Capacity classification
0b2	011
0E0	014
0-0	016

Outdoor model code

Display	Model
2J6	ERHQ-AAV3*
2A6	ERHQ-AAW1*

2.3 Overview of the Field Settings of the Hydro-box

Introduction

This chapter will show an overview of all field settings of the Hydro-box.

Content

4

2.3.1 Hydro-box Dipswitch Settings Overview

Start-up and configuration

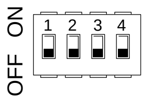
The hydro-box should be configured by the installer to match the installation environment (outdoor climate, installed options, etc.) and user expertise.

Caution! It is important that **all** information in this chapter is read sequentially by the installer and that the system is configured as applicable.

DIP switch settings overview

DIP switch SS2 is located on the switch box' PCB (“Switch Box Layout” on page 1-71.) and allows configuration of domestic hot water tank installation, room thermostat connection and pump operation.

Caution! Switch off the power supply before opening the switch box service panel and making any changes to the DIP switch settings.

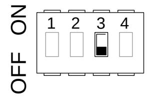


DIP switch SS2	Description	ON	OFF
1	Not applicable for installer	—	(Default)
2	Domestic hot water tank installation (See “Domestic hot water tank installation configuration” on page 4-15.)	Installed	Not installed (Default)
3	Room thermostat connection (See “Room thermostat installation configuration” on page 4-13.)	Room thermostat connected	No room thermostat connected (Default)
4	This setting[a] decides the operation mode when there is a simultaneous demand for more space heating/cooling and domestic water heating.	Heating/cooling	Domestic (Default)

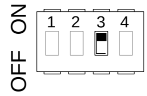
(a) only applicable in case DIP switch 2 = ON

Room thermostat installation configuration

■ When **no room thermostat** is connected to the hydro-box, toggle switch SS2-3 should be set to **OFF**.



■ When a **room thermostat** is connected to the hydro-box, toggle switch SS2-3 should be set to **ON**.



■ On the room thermostat, set the hysteresis appropriately to prevent the pump from repeatedly turning on and off (i.e. chattering), and thereby impacting the lifetime of the pump.

Notes:

■ When a room thermostat is connected to the hydro-box, the heating and cooling schedule timers are never available. Other schedule timers are not affected. For more information on the schedule timers, refer to the operation manual.

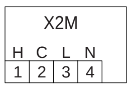
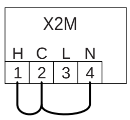
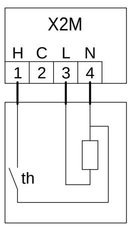
■ When a room thermostat is connected to the hydro-box, and the ☼/❄ button or ☼❄⏻ button is pressed, the centralised control indicator will flash to indicate that the room thermostat has priority and controls on/off operation and change over operation.

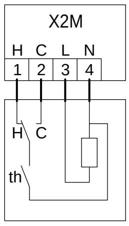
The following table summarizes the required configuration and thermostat wiring at the terminal block in the switch box. Pump operation is listed in the third column. The three last columns indicate whether the following functionality is available on the user interface (UI) or handled by the thermostat (T):

■ space heating or cooling on/off (☼❄⏻)

■ heating/cooling changeover (☼/❄)

■ heating and cooling schedule timers (⊕⊗)

Thermostat	Configuration	Pump operation	y	=	pr
No thermostat	SS2-3 = OFF wiring: (non) 	determined by leaving water temperature [a]	UI	UI	UI
	SS2-3 = ON wiring: 	on when space heating or cooling is on (y)	UI	UI	UI
Heating only thermostat	SS2-3 = ON wiring: 	on when heating request by room thermostat	T	—	—

Thermostat	Configuration	Pump operation	y	=	pr
Thermostat with heating/cooling switch	SS2-3 = ON wiring: 	on when heating request or cooling request by room thermostat	T	T	—

th = Thermostat contact

C = Cooling contact

H = Heating contact

L, N = 230 V AC

4

[a] The pump will stop when space heating/cooling is turned off or when the water reaches the desired water temperature as set on the user interface. With space heating/cooling turned on, the pump will then run every 5 minutes during 3 minutes to check the water temperature.

Pump operation configuration

Note: To set the pump speed, refer to ‘‘Setting the pump speed” on page 4-15.

Without room thermostat

When no thermostat is connected to the hydro-box, pump operation will be determined by the leaving water temperature.

To force continuous pump operation when no room thermostat is connected do the following:

- set toggle switch SS2-3 to ON,
- short-circuit the terminal numbers 23-17-13 on the terminal block in the switch box.

With room thermostat

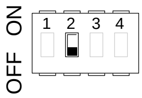
When a thermostat is connected to the hydro-box, the pump will operate continuously whenever there is heating or cooling demand requested by the thermostat.

Domestic hot water tank installation configuration

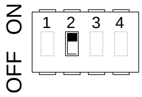
- When no domestic hot water tank is installed, toggle switch SS2-2 should be set to OFF (default).
- When a domestic hot water tank is installed, toggle switch SS2-2 should be set to ON.

Domestic hot water tank installation configuration

When **no domestic hot water tank** is installed, toggle switch SS2-2 should be set to **OFF** (default).



When a **domestic hot water tank** is installed, toggle switch SS2-2 should be set to **ON**.



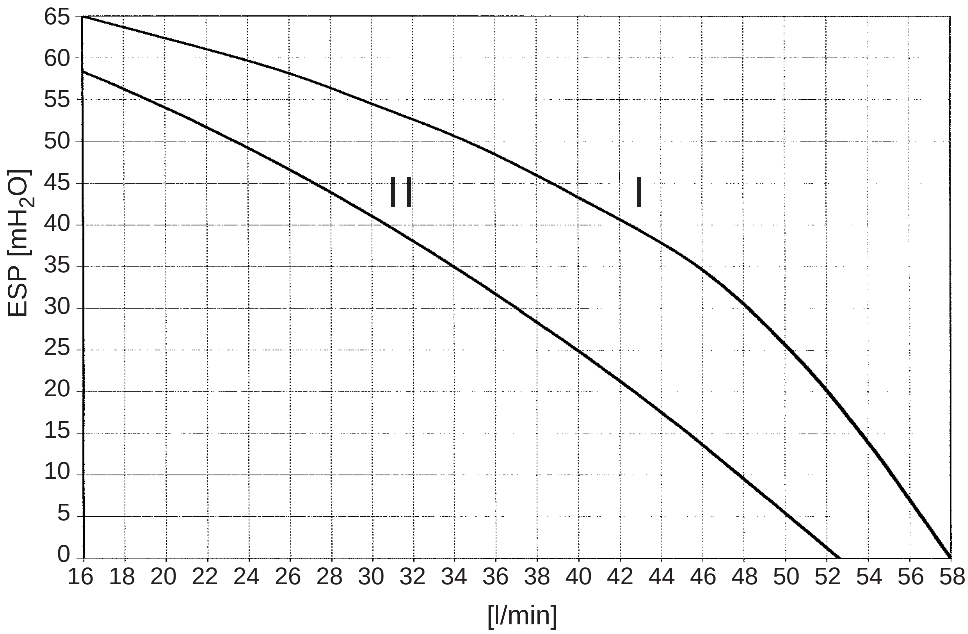
Setting the pump speed

The pump speed can be selected on the pump.

The default setting is high speed. If the water flow in the system is too high (e.g., noise of running water in the installation) the speed can be set to low speed.

Note: The speed dial on the pump indicates 3 speed settings. However, only 2 speed settings exist: low speed and high speed. The indicated medium speed setting on the speed dial is equal to low speed.

The available external static pressure (ESP, expressed in mH_2O) in function of the water flow (l/min) is shown in the graph below.



2.3.2 Hydro-box User Interface Settings Overview

Field settings table

First code	Second code	Setting name	Default value	Range	Step	Unit
0	**User permission level**					
	00	User permission level	3	2~3	1	—
1	**Weather dependent set point**					
	00	Low ambient temperature (Lo_A)	–10	–20~5	1	°C
	01	High ambient temperature (Hi_A)	15	10~20	1	°C
	02	Set point at low ambient temperature (Lo_TI)	40	25~55	1	°C
	03	Set point at high ambient temperature (Hi_TI)	25	25~55	1	°C
2	**Disinfection function**					
	00	Operation interval	Fri	Mon~Sun, All	—	—
	01	Status	1 (ON)	0/1	—	—
	02	Start time	23:00	0:00~ 23:00	1:00	hour
	03	Set point	70	40~80	5	°C
	04	Interval	10	5~60	5	min
3	**Auto restart**					
	00	Status	0 (ON)	0/1	—	—
4	**Backup heater operation**					
	00	Status	1 (ON)	0/1	—	—
	01	Priority	0 (OFF)	0/1	—	—
	02	Space heating OFF temperature	35	14~35	1	°C
5	**Equilibrium temperature and space heating priority temperature**					
	00	Equilibrium temperature status	1 (ON)	0/1	—	—
	01	Equilibrium temperature	0	–15~20	1	°C
	02	Space heating priority status	0 (OFF)	0/1	—	—
	03	Space heating priority temperatures	0	–15~20	1	°C
	04	Set point correction for domestic hot water temperature	10	0~20	1	°C
6	**DT for domestic water heating**					
	00	Start	5	1~20	1	°C
	01	Stop	2	2~10	1	°C
7	**Domestic hot water step length**					
	00	Domestic hot water step length	3	2~4	1	°C
8	**Domestic water heating mode timer**					
	00	Minimum running time	5	0~20	1	min
	01	Maximum running time	30	5~95	5	min
	02	Anti-recycling time	3	0~10	0.5	hour
	03	Booster heater delay time	20	20~95	5	min
9	**Cooling and heating set point ranges**					
	00	Heating set point upper limit	55	37~55	1	°C
	01	Heating set point lower limit	15/25	15/25~37	1	°C
	02	Cooling set point upper limit	20	18~22	1	°C
	03	Cooling set point lower limit	5	5~18	1	°C
A	**Quiet mode type**					
	00	Quiet mode type	0	0/2	—	—
	01	Status	3	—	—	—
C	**Solar priority mode**					
	00	Solar priority mode setting	0	0~2	1	—

Outline

The hydro-box should be configured by the installer to match the installation environment (outdoor climate, installed options, etc.) and user demand. Thereto, a number of so called field settings are available. These field settings are accessible and programmable through the user interface on the hydro-box.

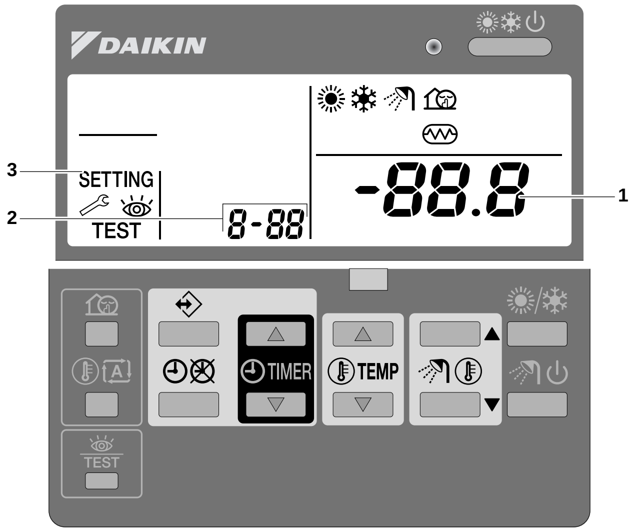
Each field setting is assigned a 3-digit number or code, for example [5-03], which is indicated on the user interface display. The first digit [5] indicates the 'first code' or field setting group. The second and third digit [03] together indicate the 'second code'.

A list of all field settings and default values is given under ‘Field settings table’ on page 4-16. In this same list, we provided for 2 columns to register the date and value of altered field settings at variance with the default value.

A detailed description of each field setting is given under ‘Detailed description’ on page 4-18

Procedure

To change one or more field settings, proceed as follows.



1. Press the TEST button for a minimum of 5 seconds to enter FIELD SET MODE.
   The SETTING icon (3) will be displayed. The current selected field setting code is indicated 8-88 (2), with the set value displayed to the right -88.8 (1).
2. Press the TEMP ▲ button to select the appropriate field setting first code.
3. Press the TEMP ▼ button to select the appropriate field setting second code.
4. Press the TIMER ▲ button and TIMER ▼ button to change the set value of the select field setting.
5. Save the new value by pressing the button.
6. Repeat step 2 through 4 to change other field settings as required.
7. When finished, press the TEST button to exit FIELD SET MODE.

Notes:

- Changes made to a specific field setting are only stored when the button is pressed. Navigating to a new field setting code or pressing the TEST button will discard the change made.
- Before shipping, the set values have been set as shown under "Field settings table" on page 23.
- When exiting FIELD SET MODE, "88" may be displayed on the user interface LCD while the unit initialises itself.

Detailed description

[0] User permission level

If required, certain user interface buttons can be made unavailable for the user.

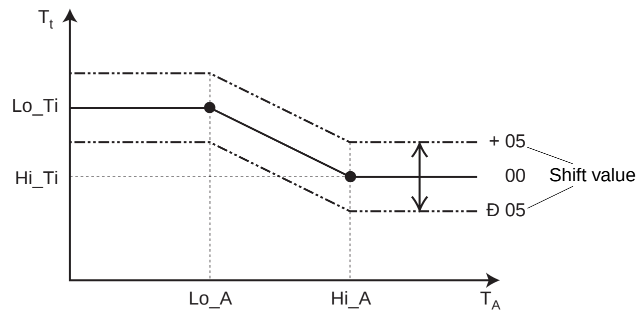
Three permission levels are defined (see the table below). Switching between level 1 and level 2/3 is done by pressing the buttons TIMER ▲ and TIMER ▼ immediately followed by the buttons , for at least 5 seconds (in normal mode). Note that no indication on the user interface is given. When level 2/3 is selected, the actual permission level — either level 2 or level 3 — is determined by the field setting [0-00].

		Permission level		
Button		**1**	**2**	**3**
Quiet mode button		operable	—	—
Weather dependent set point button		operable	—	—
Schedule timer enable/dis-able button		operable	operable	—
Programming button		operable	—	—
Time adjust buttons	TIMER ▲ TIMER ▼	operable	—	—
Inspection/test operation button	TEST	operable	—	—

[1] Weather dependent set point (heating operation only)

The weather dependent set point field settings define the parameters for the weather dependent operation of the unit. When weather dependent operation is active the water temperature is determined automatically depending on the outdoor temperature: colder outdoor temperatures will result in warmer water and vice versa. During weather dependent operation, the user has the possibility to shift up or down the target water temperature by a maximum of 5°C. See the operation manual for more details on weather dependent operation.

- [1-00] Low ambient temperature (Lo_A): low outdoor temperature.
- [1-01] High ambient temperature (Hi_A): high outdoor temperature.
- [1-02] Set point at low ambient temperature (Lo_Ti): the target outgoing water temperature when the outdoor temperature equals or drops below the low ambient temperature (Lo_A).
  Note that the Lo_Ti value should be higher than Hi_Ti, as for colder outdoor temperatures (i.e. Lo_A) warmer water is required.
- [1-03] Set point at high ambient temperature (Hi_Ti): the target outgoing water temperature when the outdoor temperature equals or rises above the high ambient temperature (Hi_A).
  Note that the Hi_Ti value should be lower than Lo_Ti, as for warmer outdoor temperatures (i.e. Hi_A) less warm water suffices.



Tt	Target water temperature
TA	Ambient (outdoor) temperature
Shift value	= Shift value

4

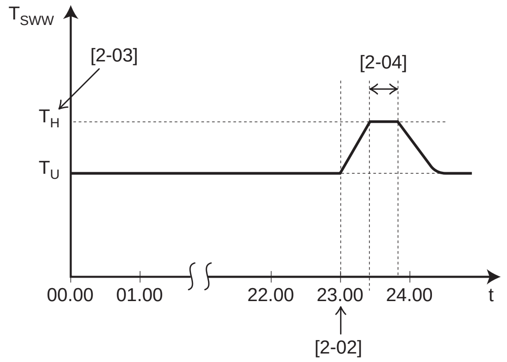
[2] Disinfection function

Applies only to installations with a domestic hot water tank.

The disinfection function disinfects the domestic hot water tank by periodically heating the domestic water to a specific temperature.

Caution! The disinfection function field settings must be configured by the installer according to national and local regulations.

- [2-00] Operation interval: day(s) of the week at which the domestic water should be heated.
- [2-01] Status: defines whether the disinfection function is turned on (1) or off (0).
- [2-02] Start time: time of the day at which the domestic water should be heated.
- [2-03] Set point: high water temperature to be reached.
- [2-04] Interval: time period defining how long the set point temperature should be maintained.



T_{SWW}	Domestic water temperature
T_U	User set point temperature (as set on the user interface)
T_H	High set point temperature [2-03]
t	Time

[3] Auto restart

When power returns after a power supply failure, the auto restart function reapplies the user interface settings at the time of the power supply failure.

Note: It is therefore recommended to leave the auto restart function enabled.

Note that with the function disabled the schedule timer will not be activated when power returns to the unit after a power supply failure. Press the ⌚⊗ button to enable the schedule timer again.

- [3-00] Status: defines whether the auto restart function is turned **ON (0)** or **OFF (1)**.

[4] Backup heater operation and space heating off temperature

Backup heater operation — Applies only to units with optional backup heater installed.
The operation of the backup heater can altogether be enabled or disabled, or it can be disabled depending on operation of the booster heater.

- [4-00] Status: defines whether backup heater operation is enabled (1) or disabled (0).
- [4-01] Priority: defines whether backup heater and booster heater can operate simultaneously (0), or if the booster heater operation has priority over the backup heater operation (1).

Note: When the priority field setting is set to ON (1), space heating performance of the system might be decreased at low outdoor temperatures, since in case of domestic water heating demand the backup heater will not be available for space heating (space heating will still be provided by the heat pump).

When the priority field setting is set to OFF (0), make sure that electrical power consumption does not exceed supply limits.

Space heating off temperature

- [4-02] Space heating off temperature: outdoor temperature above which space heating is turned off, to avoid overheating.

4

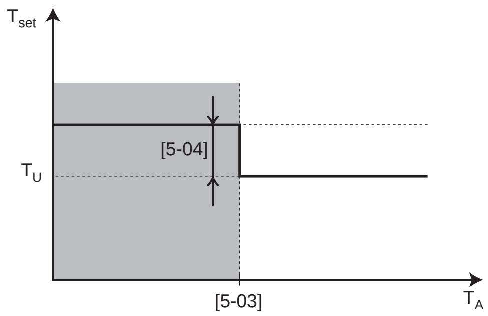
[5] Equilibrium temperature and space heating priority temperature

Equilibrium temperature — The 'equilibrium temperature' field settings apply to operation of the **optional backup heater**. When the equilibrium temperature function is enabled, operation of the backup heater is restricted to low outdoor temperatures, i.e. when the outdoor temperature equals or drops below the specified equilibrium temperature. When the function is disabled, operation of the backup heater is possible at all outdoor temperatures. Enabling this function reduces the working time of the backup heater.

- [5-00] Equilibrium temperature status: specifies whether the equilibrium temperature function is enabled (1) or disabled (0).
- [5-01] Equilibrium temperature: outdoor temperature below which operation of the backup heater is allowed.

Space heating priority temperature (applies only to installations with a domestic hot water tank) — The 'space heating priority temperature' field settings apply to operation of the 3-way valve and the **booster heater** in the domestic hot water tank.
When the space heating priority function is enabled, it is assured that the full capacity of the heat pump is used for space heating only when the outdoor temperature equals or drops below the specified space heating priority temperature, i.e. low outdoor temperature. In this case the domestic water will only be heated by the booster heater.

- [5-02] Space heating priority status: specifies whether space heating priority is enabled (1) or disabled (0).
- [5-03] Space heating priority temperature: outdoor temperature below which the domestic water will be heated by the booster heater only, i.e. low outdoor temperature.
- [5-04] Set point correction for domestic water temperature: set point correction for the desired domestic water temperature, to be applied at low outdoor temperature when space heating priority is enabled. The corrected (higher) set point will make sure that the total heat capacity of the water in the tank remains approximately unchanged, by compensating for the colder bottom water layer of the tank (because the heat exchanger coil is not operational) with a warmer top layer.



T_{set}	Domestic water set point temperature
T_U	User set point (as set on the user interface)
T_A	Ambient (outdoor) temperature
▬	Space heating priority

[6] DT for domestic water heating

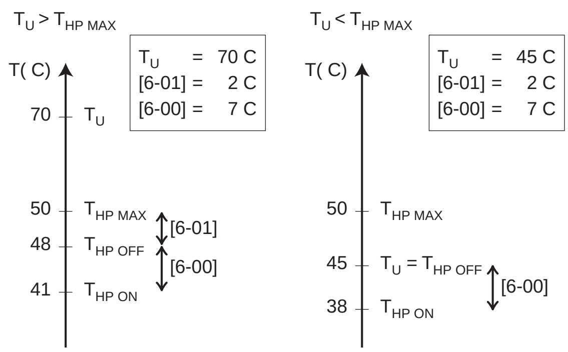
Applies only to installations with a domestic hot water tank.

The 'DT (delta temperature) for domestic water heating' field settings determine the temperatures at which heating of the domestic water by the heat pump will be started (i.e., the heat pump ON temperature) and stopped (i.e., the heat pump OFF temperature).

When the domestic water temperature drops below the heat pump ON temperature ($T_{HP\ ON}$), heating of the domestic water by the heat pump will be started. As soon as the domestic water temperature reaches the heat pump OFF temperature ($T_{HP\ OFF}$) or the user set point temperature (T_U), heating of the domestic water by the heat pump will be stopped (by switching the 3-way valve).

The heat pump OFF temperature, and the heat pump ON temperature, and its relation with field settings [6-00] and [6-01] are explained in the illustration below.

- [6-00] Start: temperature difference determining the heat pump ON temperature ($T_{HP\ ON}$). See illustration.
- [6-01] Stop: temperature difference determining the heat pump OFF temperature ($T_{HP\ OFF}$). See illustration.



T_U	User set point temperature (as set on the user interface)
$T_{HP\ MAX}$	Maximum heat pump temperature at sensor in domestic hot water tank (50°C) (depending on T_A)
$T_{HP\ OFF}$	Heat pump OFF temperature
$T_{HP\ ON}$	Heat pump ON temperature

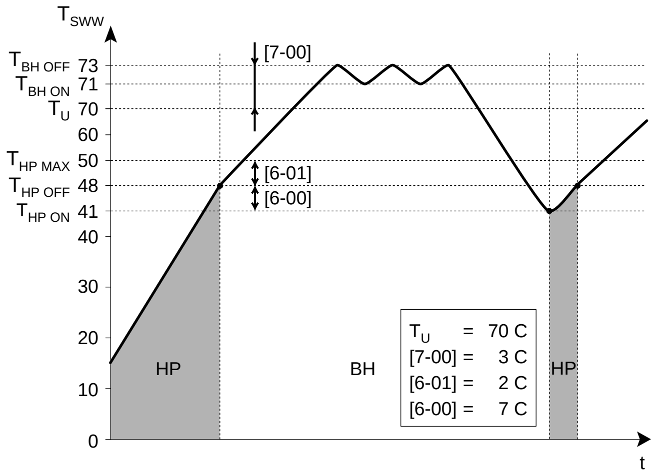
[7] Domestic water step length

Applies only to installations with a domestic hot water tank.

When the domestic water is heated and the domestic water set point temperate (as set by the user) has been reached, the booster heater will continue to heat the domestic water to a temperature a few degrees above the set point temperature, i.e. the booster heater OFF temperature. These extra degrees are specified by the domestic water step length field setting. Correct setting prevents the booster heater from repeatedly turning on and off (i.e. chattering) to maintain the domestic water set point temperature. Note: the booster heater will turn back on when the domestic water temperature drops 2°C (fixed value) below the booster heater OFF temperature.

Note: If the schedule timer for booster heater (see the operation manual) is active, the booster heater will only operate if allowed by this schedule timer.

- [7-00] Domestic water step length: temperature difference above the domestic water set point temperature before the booster heater is turned off.



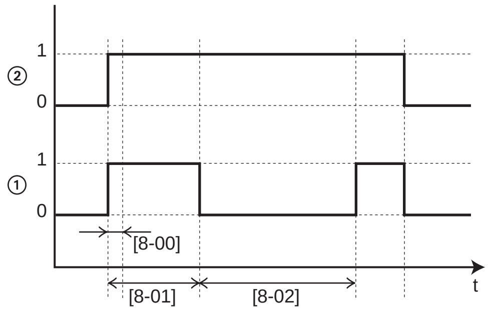
BH	Booster heater
HP	Heat pump. If heating up time by the heat pump takes too long, auxiliary heating by the booster heater can take place
$T_{BH\ OFF}$	Booster heater OFF temperature (T_U + [7-00])
$T_{BH\ ON}$	Booster heater ON temperature ($T_{BH\ OFF}$ - 2°C)
$T_{HP\ MAX}$	Maximum heat pump temperature at sensor in domestic hot water tank (depending on T_a)
$T_{HP\ OFF}$	Heat pump OFF temperature ($T_{HP\ MAX}$ - [6-01])
$T_{HP\ ON}$	Heat pump ON temperature ($T_{HP\ OFF}$ - [6-00])
T_{SWW}	Domestic water temperature
T_U	User set point temperature (as set on the user interface)
t	Time

[8] Domestic water heating mode timer

Applies only to installations with a domestic hot water tank.

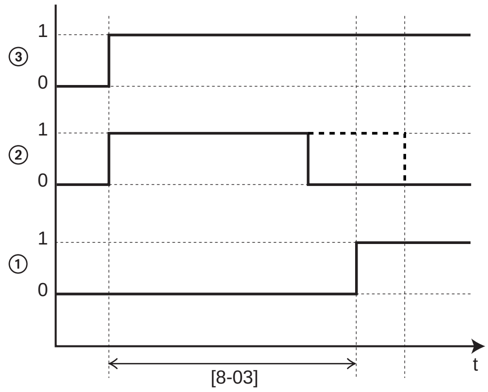
The 'domestic water heating mode timer' field settings defines the minimum and maximum domestic water heating times, and minimum time between two domestic water heating cycli.

- [8-00] Minimum running time: specifies the minimum time period during which domestic water heating should be activated, even when the target domestic water temperature has already been reached.
- [8-01] Maximum running time: specifies the maximum time period during which domestic water heating can be activated, even when the target domestic water temperature has not yet been reached.
  Note that when the unit is configured to work with a room thermostat (refer to "Room thermostat installation configuration" on page 17), the maximum running timer will only be taken into account when there is a request for space cooling or space heating. When there is no request for room cooling or room heating, domestic water heating by the heat pump will continue until the "heat pump OFF temperature" (see field settings [5]) is reached. When no room thermostat is installed, the timer is always taken into account.
- [8-02] Anti-recycling time: specifies the minimum required interval between two domestic water heating cycli.



1	Domestic water heating (I = active, 0 = not active)
2	Hot water request (I = request, 0 = no request)
t	Time

■ [8-03] Booster heater delay time: specifies the start-up time delay of the booster heater operation after start of the heat pump domestic operation.



1	Booster heater operation (I = active, 0 = not active)
2	Heat pump domestic operation (I = request, 0 = no request)
3	Hot water request (I = request, 0 = no request)
t	Time

4

Notes:

■ Take care that [8-03] is always smaller than the maximum running time [8-01].

■ By adapting the booster heater delay time versus the maximum running time, an optional balance can be found between the energy efficiency and the heat up time.

■ However, if the booster heater delay time is set too high, it might take a long time before the domestic water reaches its set temperature upon domestic mode request.

Example:

energy saving settings		quick heating settings (default)
[8-01]	20~95 min	30 min
[8-03]	20~95 min	20 min

[9] Cooling and heating set points

The purpose of this field setting is to prevent the user from selecting a wrong (i.e., too hot or too cold) leaving water temperature. Thereto the heating temperature set point range and the cooling temperature set point range available to the user can be configured.

Caution!

- In case of a floor heating application, it is important to limit the maximum leaving water temperature at heating operation according to the specifications of the floor heating installation.
- In case of a floor cooling application, it is important to limit the minimum leaving water temperature at cooling operation to 16°C to prevent condensation on the floor.

- [9-00] Heating set point upper limit: maximum leaving water temperature for heating operation.
- [9-01] Heating set point lower limit: minimum leaving water temperature for heating operation.
- [9-02] Cooling set point upper limit: maximum leaving water temperature for cooling operation.
- [9-03] Cooling set point lower limit: minimum leaving water temperature for cooling operation.

[A] Quiet mode

This field setting allows to select the desired quiet mode. Two quiet modes are available: quiet mode A and quiet mode B.

In quiet mode A, priority is given to the outdoor unit operating quietly under **all** circumstances. Fan and compressor speed (and thus performance) will be limited to a certain percentage of the speed at normal operation. In certain cases, this might result in reduced performance.

In quiet mode B, quiet operation might be overridden when higher performance is required. In certain cases, this might result in less quiet operation of the outdoor unit to meet the requested performance.

- [A-00] Quiet mode type: defines whether quiet mode A (0) or quiet mode B (2) is selected.
- [A-01] Parameter 01: do not change this setting. Leave it set to its default value.

Caution! Do not set other values than the ones mentioned.

[C] Solar priority mode

Simultaneous water heating by the sun and water heating by the heat pump is not possible.

By default, heating of the tank by the heat pump has priority over heating by the sun.

This means that, whenever there is a request of the domestic hot water thermostat and domestic water heating is enabled (by the schedule timer or domestic water heating ON/OFF button, refer to the operation manual of the indoor unit), heating will be done by the heat pump. In case solar heating is busy, solar heating will be stopped.

This is to avoid shortage of domestic hot water in case the solar radiation is very weak, or solar radiation only became high shortly before domestic hot water demand is expected (e.g. on a cloudy day).

This default setting can be changed, so that at all times, when solar heat becomes available, domestic water heating by the heat pump will be (if busy) interrupted and taken over by the sun.

In order to change this, put the field parameter [C-00] to 0. Refer to the installation manual of the indoor unit, paragraph “Field settings” to find out how to access and change field parameters. [C-00] put to 0 means solar priority, [C-01] put to 1 means heat pump priority.

Notes:

- Be aware that setting this parameter to 0 might cause insufficient warm water at the time of domestic hot water demand during days with weak solar intensity. If you are not sure about the availability of hot water, check the domestic hot water temperature on the controller (see operation manual of the indoor unit) and if too low, push the 'booster domestic hot water' button. This will trigger domestic water heating by the heat pump immediately.
- The booster heater in the domestic hot water tank can work independent from the solar heating or domestic water heating by the heat pump. For a detailed decision flow on domestic water heating by solar kit or by heat pump, and/or booster heater, refer to the annexes of the installation manual EKSOLHWAV1.

2.4 Overview of the Field Setting on the Outdoor Unit

Introduction

This chapter will show an overview of the field settings on the outdoor unit.

Setting overview

The table below contains the settings on the Outdoor Unit PCB.

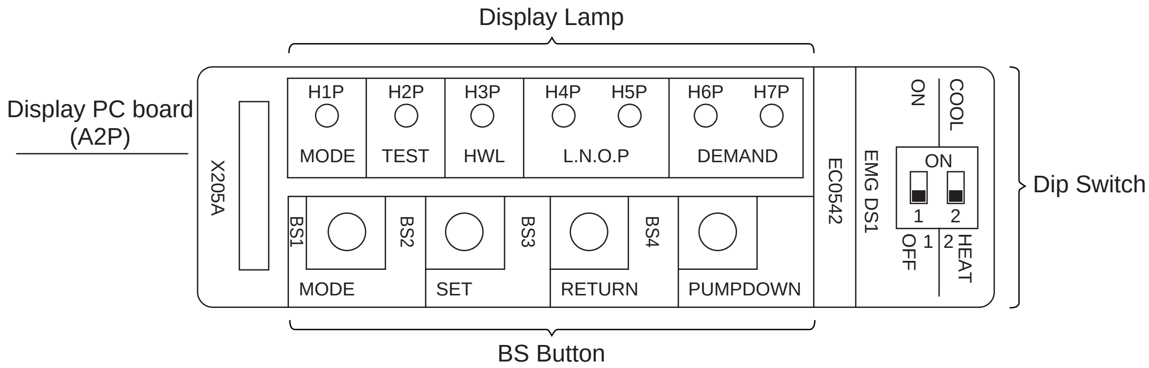
A
- Pump down setting
- Forced defrost setting

B
- Operation status setting
- Refrigerant recovery setting
- Monitoring mode setting

Content

2.4.1 Overview of the Service PCB on the Outdoor Unit

Various settings are available by using the DIP switches and the BS buttons on the Printed-Circuit Board (Display PC board: A2P).



	Display			Function or Operating Procedure	
	Mark		Name		
Display Lamp	H1P		MODE	During "Setting mode 1," the lamp is OFF (●).	During "Monitor mode," the lamp blinks (☼).
	H2P		TEST	During test operation in "Setting mode 1," the lamp is ON (☼).	During "Monitor mode," the lamp is OFF (●).
	H3P		HWL	When a malfunction occurs during "Setting mode 1," the lamp turns ON (☼).	
	H4P		L.N.O.P	During "Setting mode 1," low noise level is displayed.	During "Monitor mode," various combinations of the lamp indicate the following conditions: ■ Indication of oil return operation ■ Indication of outdoor unit class ■ Indication of malfunction code (the latest and up to 2 cycles before) ■ Indication of causes of stepping-down
	H5P				
	H6P		DEMAND	Not applicable	
	H7P				
BS Button	BS1		MODE	Used to change "Setting mode".	
	BS2		SET	Used to change "Setting item" and "Setting condition".	
	BS3		RETURN	Used to decide "Setting item" and "Setting condition".	
	BS4		PUMP DOWN	Used for pump down operation, forced oil return operation and forced defrost operation.	
Dip Switch	DS1-1	ON	EMERGENCY	Switch from "OFF" to "ON" for emergency operation (forced operation).	
		OFF(∗)			
	DS1-2	COOL		In case of heating in emergency operation, maintain "HEAT" and in case of cooling in emergency operation, switch to "COOL".	
		HEAT(∗)			

∗Factory settings: "OFF" and "HEAT"

2.4.2 Pump Down / Forced Defrosting (A)

Pressing the BS button forcibly operates the air conditioner in the cooling mode.

1 To conduct a pump-down operation (sending refrigerant to outdoor unit), press the BS button to forcibly operate the equipment in the cooling mode, then operate the unit for about 1 minute to stabilize the system. After stabilizing system, close the liquid pipe stop valve on the outdoor unit, and after the pressure decreases and the low pressure sensor activates, close the gas pipe stop valve.

2 Forced defrost
To activate the defrost operation during the heating operation, press the BS button. This will activate the forced defrost operation (cooling operation).
When the defrost cancel conditions are met, the equipment automatically switches off the defrost operation.

2.4.3 Setting by BS Buttons (B)

Mode overview

With "Setting mode 1," "Setting mode 2" and "Monitor mode," various settings and data can be checked.

1 **Setting mode 1**

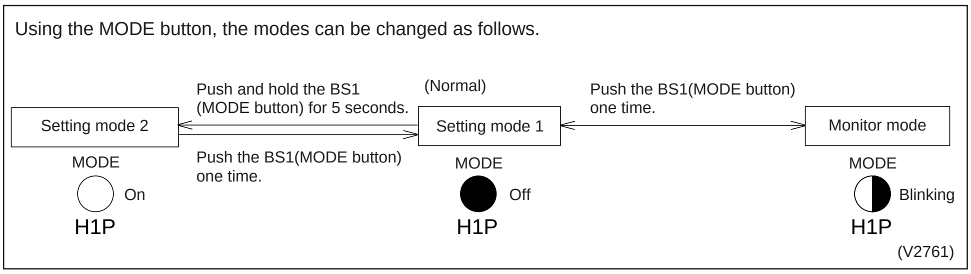
The initial status (normal operation) is "Setting mode 1." This mode indicates operating status - "TEST (test operation)," "HWL (malfunction)".

2 **Setting mode 2**

To activate “Refrigerant Recovery mode”.

3 **Monitor mode**

This mode indicates "oil return operation," "outdoor unit class," "contents of retry," "contents of malfunction," "causes of stepping-down operation," etc.

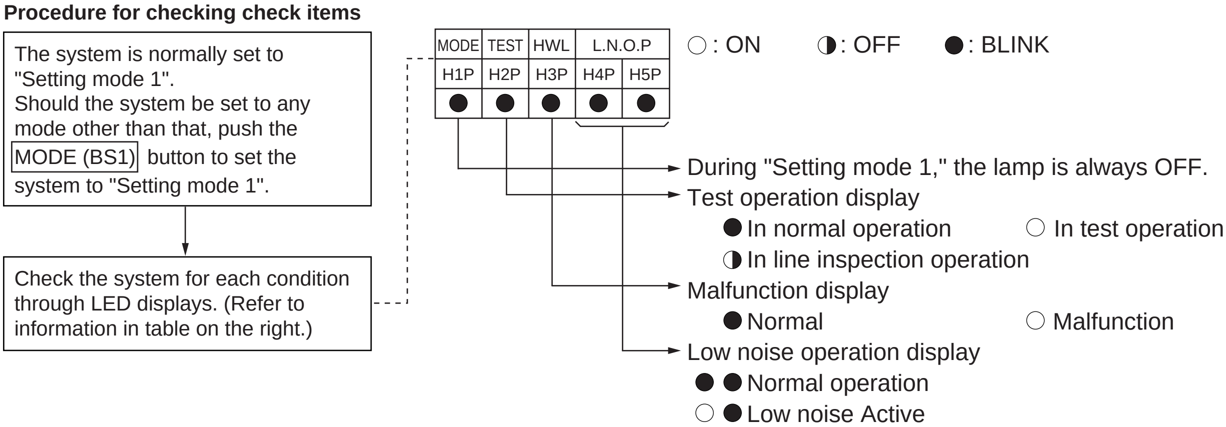


Setting mode 1

Using this mode, the following conditions can be checked:

- Current operating condition (normal/test operation/line inspection and normal/malfunction)
- Low noise operating

These conditions above can be checked by performing the following steps:



Setting mode 2

In this mode, settings for the following items can be made by using BS buttons.

Push and hold the MODE (BS1) button for 5 seconds and set to “Setting mode 2”.

↓

<Selection of setting items>

Push the SET (BS2) button and set the LED display to a setting item shown in the table on the right.
↓
Push the RETURN (BS3) button and decide the item. (The present setting condition is blinked.)

↓

<Selection of setting conditions>

Push the SET (BS2) button and set to the setting condition you want.
↓
Push the RETURN (BS3) button and decide the condition.

↓

Push the RETURN (BS3) button and set to the initial status of “Setting mode 2”.

∗ If you become unsure of how to proceed, push the MODE (BS1) button and return to setting mode 1.

No.	Display of setting items								Display of setting condition							
	Setting item	LED display							Setting condition	LED display						
		H1P	H2P	H3P	H4P	H5P	H6P	H7P		H1P	H2P	H3P	H4P	H5P	H6P	H7P
28	Refrigerant recovery mode	☼	●	☼	☼	☼	●	●	OFF (factory setting)	☼	●	●	●	●	●	☼
									ON	☼	●	●	●	●	☼	●

The figures in the columns under "No." represent the number of times to push the SET (BS2) button.

Setting of refrigerant recovery mode

When a refrigerant recovery unit is connected on site to recover refrigerant, fully open the expansion valve of the outdoor unit to help the recovery.

[Work procedure]

1. Stop operation.
2. Turn ON refrigerant recovery mode by performing the following steps.

●: OFF ◐: BLINK ☼: ON

Operating procedure	H1P	H2P	H3P	H4P	H5P	H6P	H7P
Push and hold the MODE (BS1) button of "Setting mode 1" for 5 seconds or more and set to "Setting mode 2."	☼	●	●	●	●	●	●
Push the SET (BS2) button 28 times to set the LED display as shown in the table on the right. (∗1)	☼	●	☼	☼	☼	●	●
Push the RETURN (BS3) button once. (Present settings are displayed.)	☼	●	●	●	●	●	◐
Push the SET (BS2) button once to set the LED display as shown in the table on the right.	☼	●	●	●	●	◐	●
Push the RETURN (BS3) button once to make a decision.	☼	●	●	●	●	☼	●
When the RETURN (BS3) button is pushed once again, the electronic expansion valve opens fully. (For RZQ-KTLT, the solenoid valve also opens.)	☼	●	●	●	●	●	●

3. Connect a refrigerant recovery unit to perform refrigerant recovery. (For a refrigerant recovery port, refer to the installation manual.)

4 Upon completion of refrigerant recovery, turn OFF refrigerant recovery mode by taking the following steps or turning OFF the power of outdoor unit.

Operating procedure	H1P	H2P	H3P	H4P	H5P	H6P	H7P
Push the SET (BS2) button 28 times to set the LED display as shown in the table on the right. (∗1)	☼	●	☼	☼	☼	●	●
Push the RETURN (BS3) button once. (Present settings are displayed.)	☼	●	●	●	●	◐	●
Push the SET (BS2) button once to set the LED display as shown in the table on the right.	☼	●	●	●	●	●	◐
Push the RETURN (BS3) button once to make a decision.	☼	●	●	●	●	●	☼
When the RETURN (BS3) button is pushed once again, the electronic expansion valve fully opens. (For RZQ-KTLT, the solenoid valve also closes.)	☼	●	●	●	●	●	●

∗1:If you become unsure how many times you have pushed the button, push the MODE (BS1) button once to return to "Setting mode 1" and start the operating procedure all over again.

Monitor mode

In this mode, the following items can be checked by using the BS buttons.

To enter the monitor mode, push the MODE (BS1) button when in ìSetting mode 1î.

<Selection of setting item>

Push the SET (BS2) button and set the LED display to a setting item.

<Confirmation on setting contents>

Push the RETURN (BS3) button to display different data of set items.

Push the RETURN (BS3) button and switches to the initial status of ìMonitor modeî.

∗ Push the MODE (BS1) button and returns to ìSetting mode 1î.

No.	Setting item	LED display							Data display
		H1P	H2P	H3P	H4P	H5P	H6P	H7P	
0	Indication of oil return operation	◑	●	●	●	●	●	●	See Data display ①.
1	Indication of outdoor unit class	◑	●	●	●	●	●	○	See Data display ②.
2	Contents of retry (the latest)	◑	●	●	●	●	○	●	See "Malfunction code display" on the next page.
3	Contents of retry (1 cycle before)	◑	●	●	●	●	○	○	
4	Contents of retry (2 cycle before)	◑	●	●	●	○	●	●	
5	Contents of malfunction (the latest)	◑	●	●	●	○	●	○	
6	Contents of malfunction (1 cycle before)	◑	●	●	●	○	○	●	
7	Contents of malfunction (2 cycle before)	◑	●	●	●	○	○	○	
10	Indication of causes of stepping-down operation	◑	●	●	○	●	○	●	See Data display ③.

The numbers in the "No." column represent the number of times to press the SET (BS2) button .

Data display ①

Display contents	LED display						
	H1P	H2P	H3P	H4P	H5P	H6P	H7P
In normal operation	◑	●	●	●	●	●	●
In oil return operation	◑	●	●	●	●	●	◑

Data display ②

Display contents	LED display						
	H1P	H2P	H3P	H4P	H5P	H6P	H7P
No setting	◑	●	●	●	●	●	◑
ERHQ011~014AAV3	◑	●	●	◑	●	●	◑
ERHQ016AAV3	◑	●	●	◑	●	◑	●

Data display ③

Display contents	LED display						
	H1P	H2P	H3P	H4P	H5P	H6P	H7P
Normal (not in stepping-down operation)	◑	●	●	●	●	●	◑
Low pressure stepping-down	◑	●	●	●	●	◑	●
High pressure stepping-down	◑	●	●	●	●	◑	◑
Inverter discharge pipe stepping-down	◑	●	●	●	◑	●	●
Inverter current stepping-down	◑	●	●	●	◑	●	◑
Radiation fin temperature stepping-down	◑	●	●	●	◑	◑	●
Inverter stepping-down	◑	●	●	●	◑	◑	◑
Overall current stepping-down	◑	●	●	◑	●	●	●
Other stepping-down	◑	●	●	◑	●	●	◑

4

3 Test Run and Operation Data

Introduction

This chapter contains the following information:

- External static pressure graph
- Operation ranges.

Overview

This chapter contains the following topics:

3.1 Operation Range ERHQ011~016AAV3

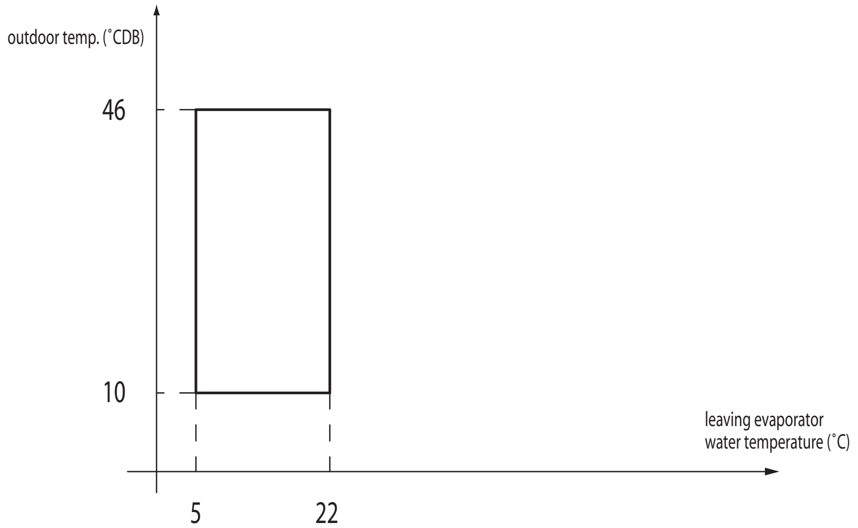
Conditions

The illustrations in this section are based on the following conditions:

- Equivalent piping length: 7.5 m
- Level difference: 0 m
- Air flow rate: High.

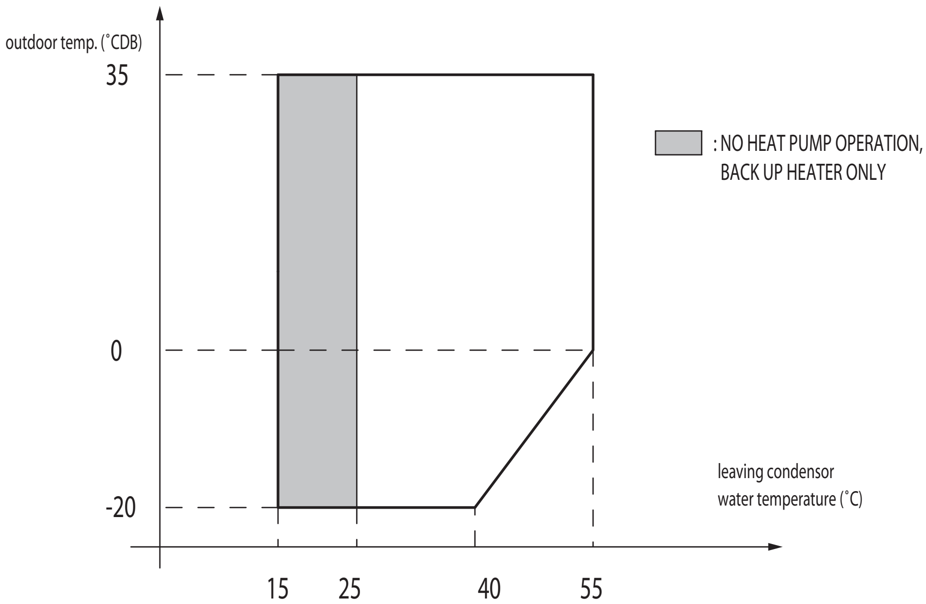
Operation range: Cooling

The illustration below shows the operation range.



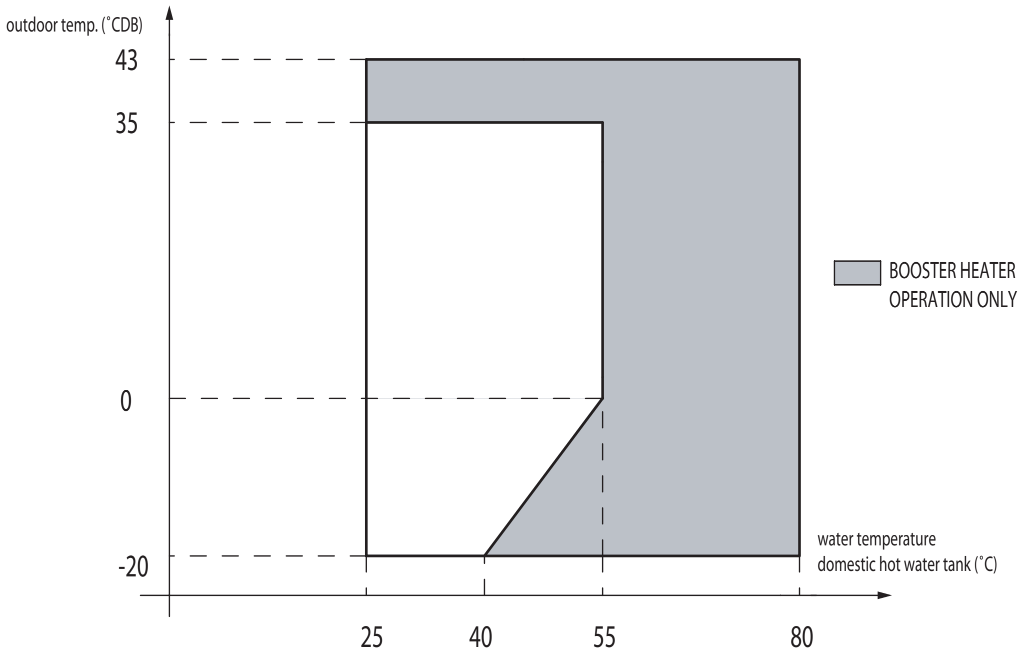
Operation range: Heating

The illustration below shows the operation range.



DHW mode

The illustration below shows the operation range.



3.2 Operation Range ERHQ011~016AAW1

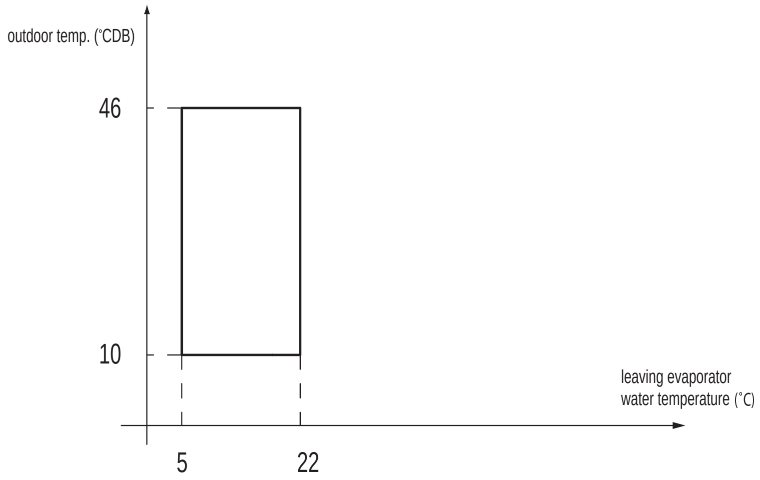
Conditions

The illustrations in this section are based on the following conditions:

- Equivalent piping length: 7.5 m
- Level difference: 0 m
- Air flow rate: High.

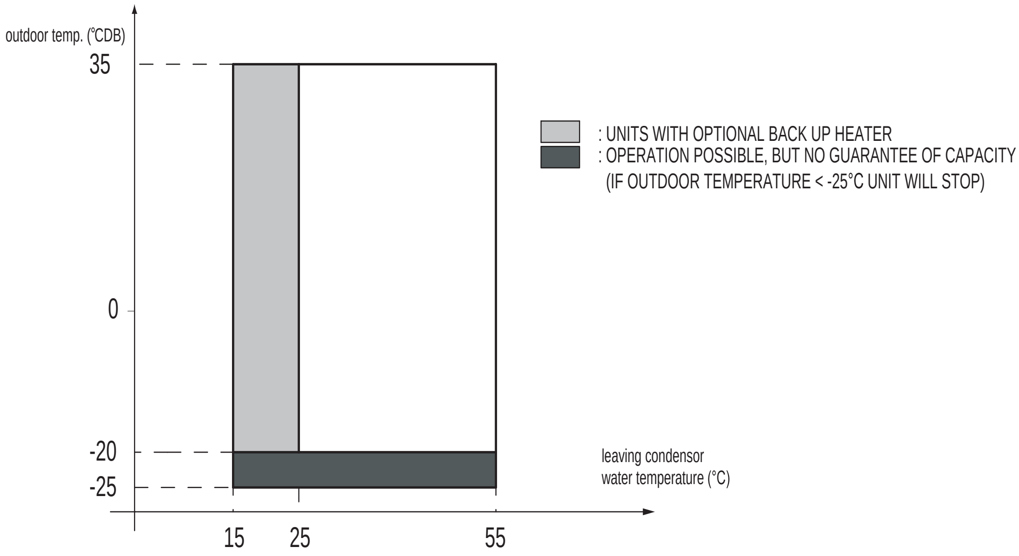
Operation range: Cooling

The illustration below shows the operation range.



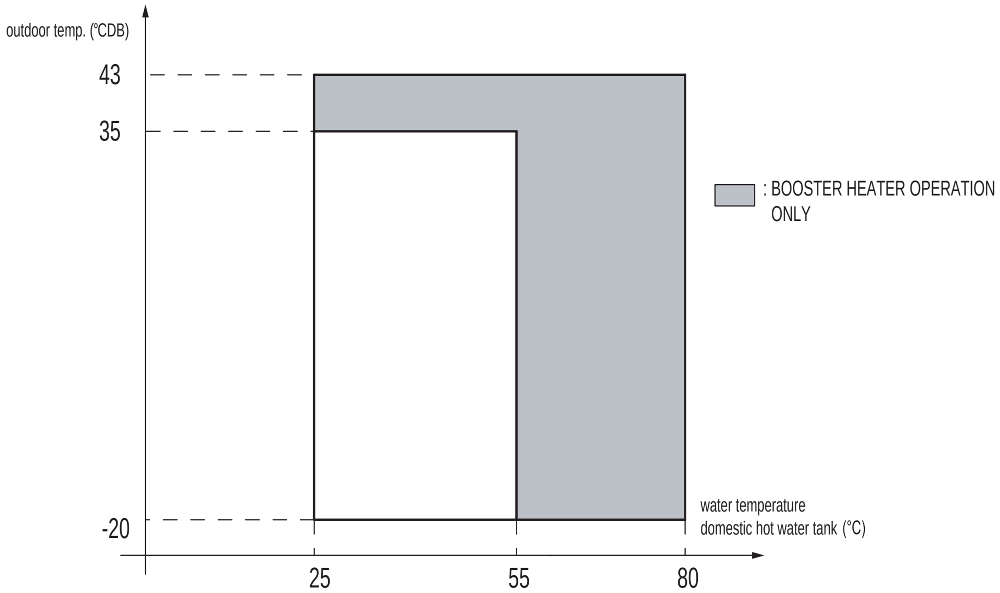
Operation range: Heating

The illustration below shows the operation range.



DHW mode

The illustration below shows the operation range.



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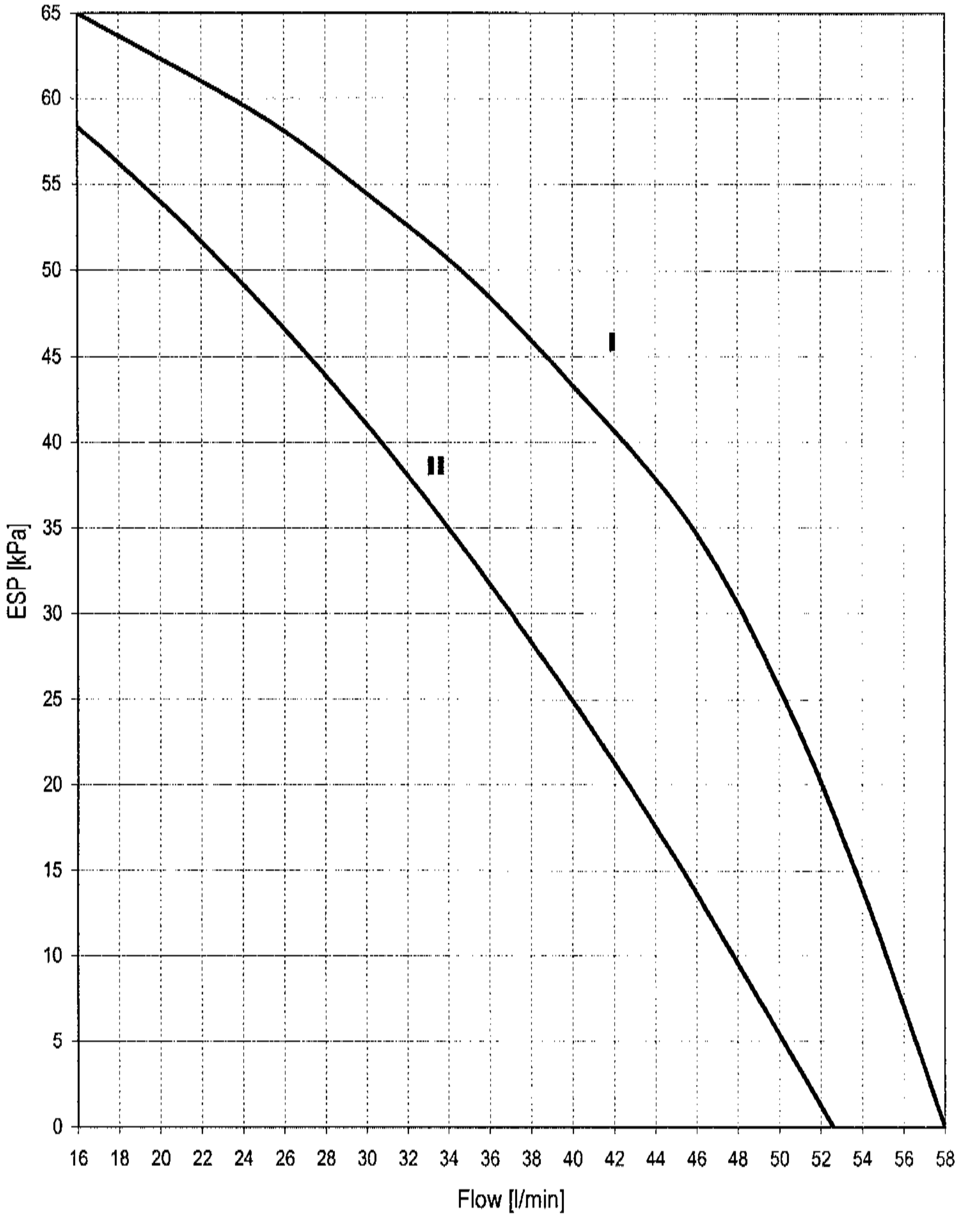
3.3 External Static Pressure

External static pressure

The illustration below shows the external static pressure of the unit depending on the water flow and the pump setting.



I	high speed
II	medium speed
ESP	external static pressure
Flow	waterflow through the unit

Warning!

- Selecting a flow outside the curves can cause damage to or malfunction of the unit. See also minimum and maximum allowed water flowrange in the technical specifications.
- Water quality must be according to EN directive EC 98/83 EC.

Part 5
Maintenance and Disassembly

What is in this part?

This part contains the following chapters:

5

1 Maintenance

1.1 What Is in This Chapter?

Introduction

This chapter contains the following information:

- Maintenance

Overview

This chapter contains the following topics:

1.2 Maintenance

Introduction

In order to ensure optimal availability of the unit, a number of checks and inspections on the unit and the field wiring have to be carried out at regular intervals.

Precaution

- Before carrying out any maintenance or repair activity, always switch off the circuit breaker on the supply panel, remove the fuses or open the protection devices of the unit.
- Make sure that before starting any maintenance or repair activity, also the power supply to the outdoor unit is switched off.

Overview

The described checks must be executed at least **once a year**.

1 Water pressure

Check if the water pressure is above 0.3 bar. If necessary add water.

2 Water filter

Clean the water filter.

3 Water pressure relief valve

Check for correct operation of the pressure relief valve by turning the red knob on the valve counter-clockwise:

- If you do not hear a clacking sound, contact your local Daikin dealer.
- In case the water keeps running out of the unit, close both the water inlet and outlet shut-off valves first and then contact your local Daikin dealer.

4 Pressure relief valve hose

Check that the pressure relief valve hose is positioned appropriately to drain the water.

If the (optional) drain pan kit is installed, make sure that the pressure relief valve hose end is positioned in the drain pan.

5 Backup heater vessel insulation cover

Check that the backup heater insulation cover is fastened tightly around the backup heater vessel.

6 Domestic hot water tank pressure relief valve (field supply)

Applies only to installations with a domestic hot water tank.

Check for correct operation of the pressure relief valve on the domestic hot water tank.

7 Domestic hot water tank booster heater

Applies only to installations with a domestic hot water tank.

It is advisable to remove lime buildup on the booster heater to extend its life span, especially in regions with hard water. To do so, drain the domestic hot water tank, remove the booster heater from the domestic hot water tank and immerse in a bucket (or similar) with lime-removing product for 24 hours.

8 Hydro-box switch box

- Carry out a thorough visual inspection of the switch box and look for obvious defects such as loose connections or defective wiring.
- Check for correct operation of contactors K1M, K2M, K3M, K5M (applications with domestic hot water tank only) and K4M by use of an ohmmeter. All contacts of these contactors must be in open position.

2 Removal procedure: outdoor unit ERHQ011~016AAV3

2.1 What Is in This Chapter?

Introduction

This chapter contains the following information:

- Removal procedure: outdoor unit

Overview

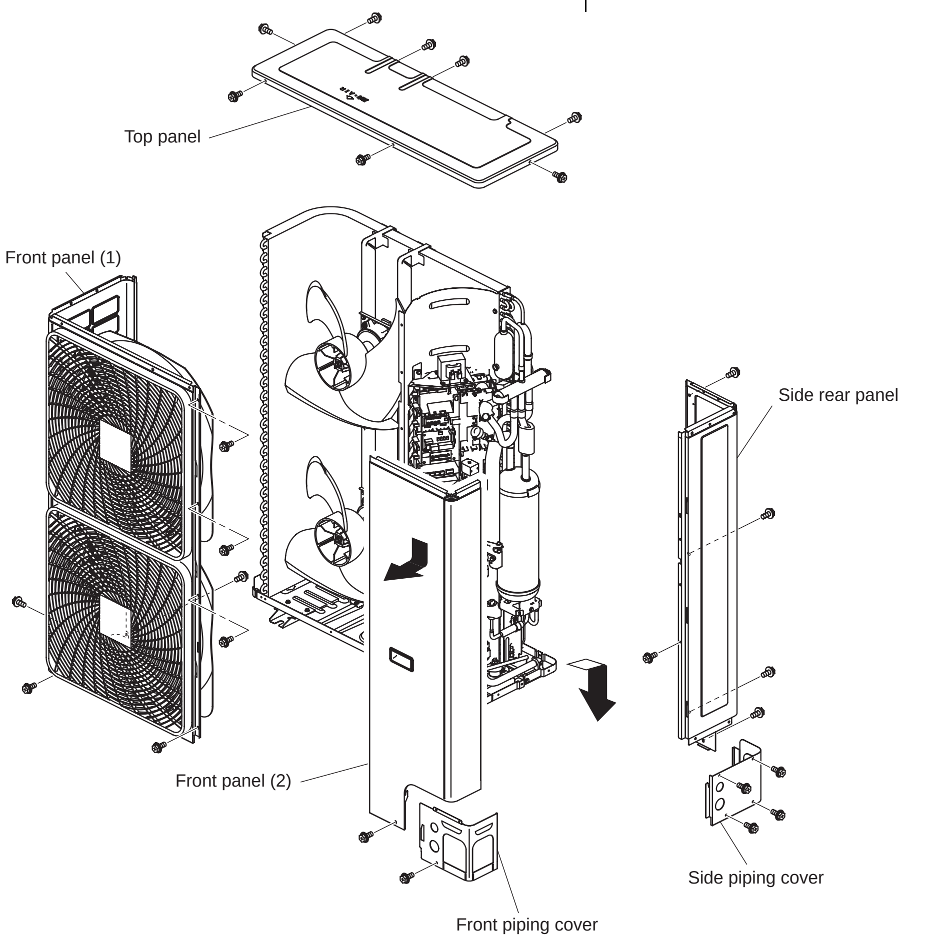
This chapter contains the following topics:

2.2 Removal of Outside Panels

Procedure

Warning! Be sure to commence the disassembling work after 10 minutes or more elapsed from all power supplies have been turned off.

Step	Procedure	Points
1	For the front panel (1), unscrew a single mounting screw and then push this panel downward to remove it.	
2	For the top panel, unscrew the eight mounting screws and then remove this panel.	
3	For the front panel (1), unscrews the seven mounting screws and the remove this panel.	
4	For the front piping cover, unscrew a single mounting screw and then remove this panel.	
5	For the side piping cover, unscrew the four mounting screws and then remove this panel.	
6	For the side rear panel, unscrew the five mounting screws and then remove this panel.	



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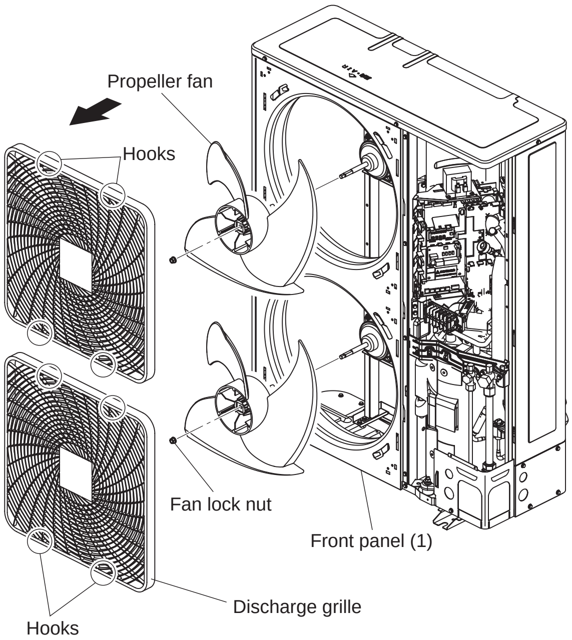
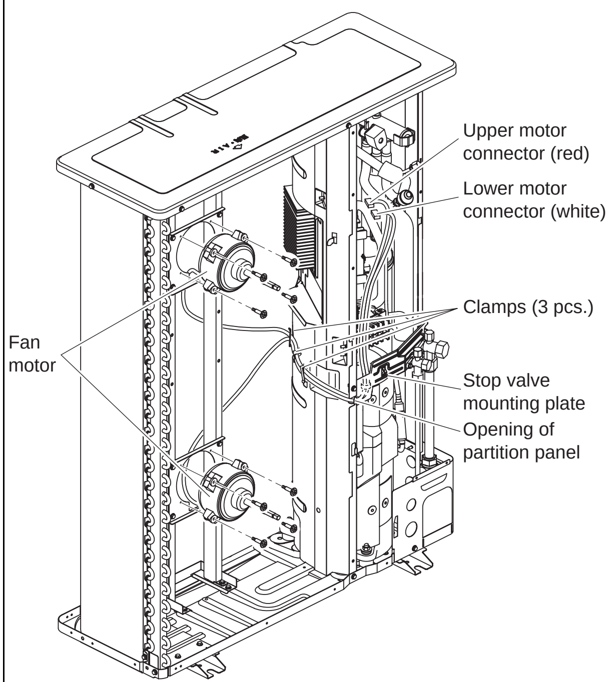
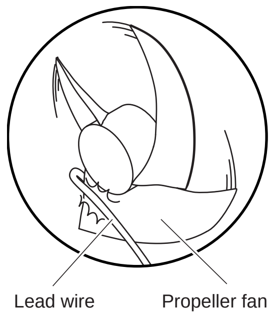
2.3 Removal of Propeller Fan and Fan Motor

Procedure

Warning! Be sure to commence the disassembling work after 10 minutes or more elapsed from all power supplies have been turned off.

Step	Procedure		Points
■	Remove the front panel (2) accordance with the Removal Procedure for Outside Panels.		
Remove the propeller fan			
1	Unscrew the four screws that fix the air discharge grille and disengage the four hooks at the top and bottom of the grille, and then remove this air discharge grille.		
2	Unfasten the fan lock nut that fixes the propeller fan.		
Remove the fan motor			
■	Remove the front panel (1) accordance with the Removal Procedure for Outside Panels.		
1	Remove the connector (X206A, X207A) for fan motor from the PC board.		■ In order to disconnect the connector, do not pull the lead wire. Hold the connector part and then push the hooks. 
2	Cut the cable tie of lead wires (located on the reverse side of the stop valve mounting plate).		
3	Pull out the lead wires through the opening of the partition panel, and then unclamp the three clamps. (Note that the partition plate has three hooks.)		■ Cautions in mounting the motor Be sure to fix the motor lead wire with a clamp. Not heeding this caution will cause the entanglement of the lead wire around the fan, which will result in damage to the fan.
4	Unfastening the four lock from the fan motor, enables the removal of this motor.		

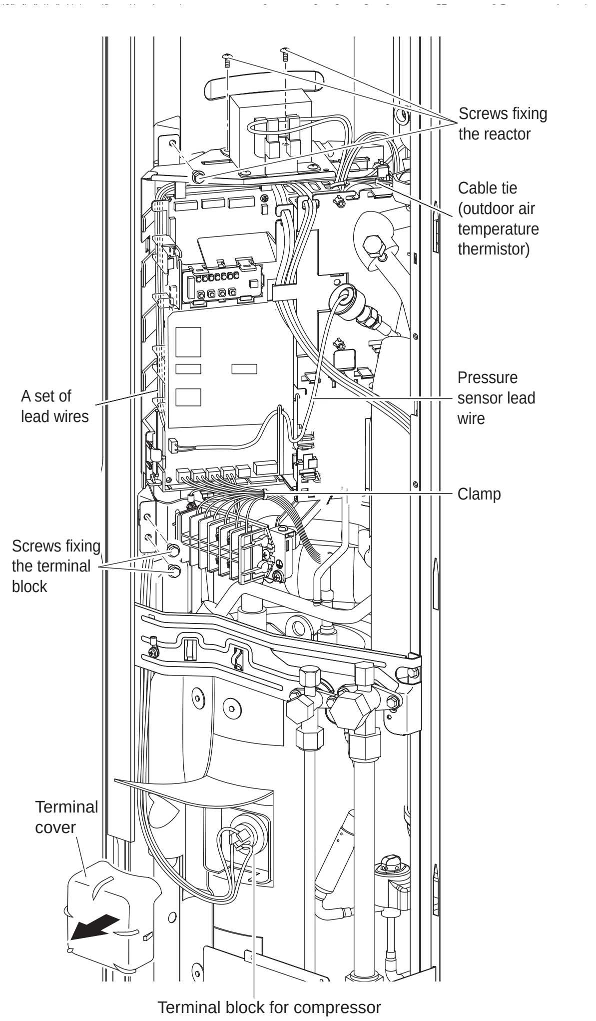
5

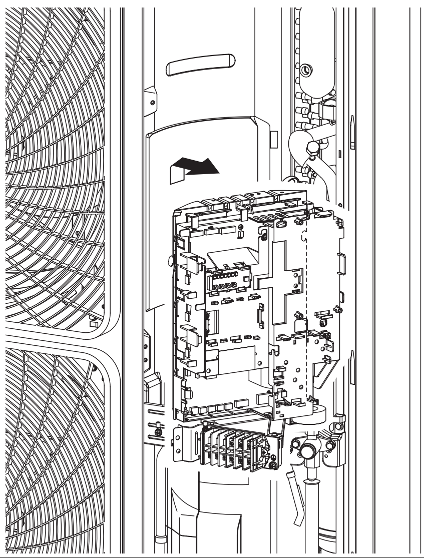
2.4 Removal of Switch Box

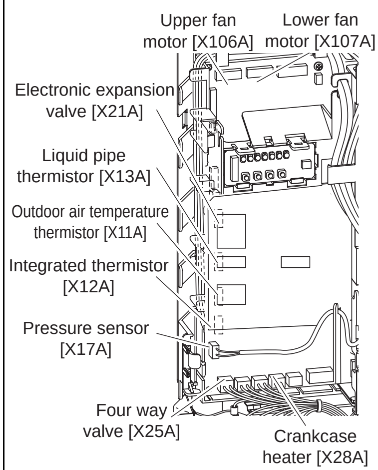
Procedure

Warning! Be sure to commence the disassembling work after 10 minutes or more elapsed from all power supplies have been turned off.

Step	Procedure	Points
■	Remove the front panel (2) accordance with the Removal Procedure for Outside Panels.	■ If the top panel cannot be removed Even though workability is degraded, it is possible to pull the switch box to the front without removing the top panel.
1	Disconnect each connector on the PC board. (Refer to the Points column.)	
2	Remove the two Faston terminals. After that, unscrew the three screws that fix the reactor, and then remove the reactor.	■ The figure below shows connectors to be disconnected.
3	Cut the clamp.	
4	Remove the clamp of the pressure sensor lead wire.	
5	Cut the clamp of the outdoor air temperature thermistor.	
6	Disconnect a set of lead wires together from the clamp.	
7	Remove the terminal cover, and then disconnect the three lead wires from the terminal block for the compressor.	■ Precaution for mounting the pressure sensor To prevent the lead wire from hanging over the PC board, hook the lead wire of 160 to 170 mm in length from the front end of the connector on the clamp.
8	Unscrew the two screws that fix the terminal block.	
9	Disengage the three hooks, and then pull out the switch box upward.	



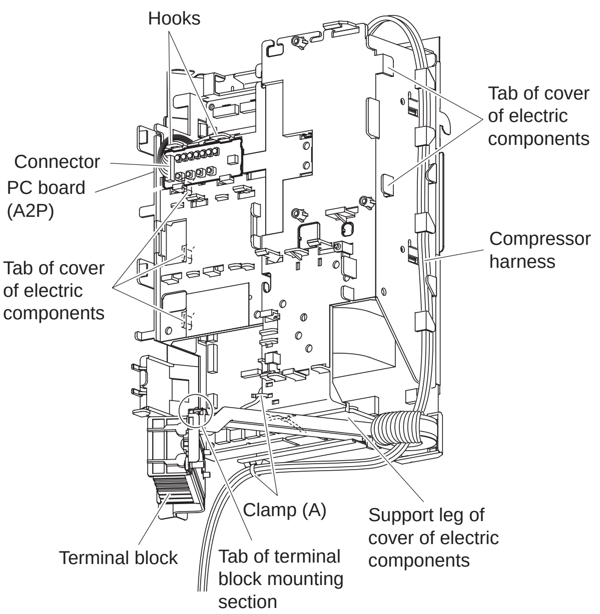
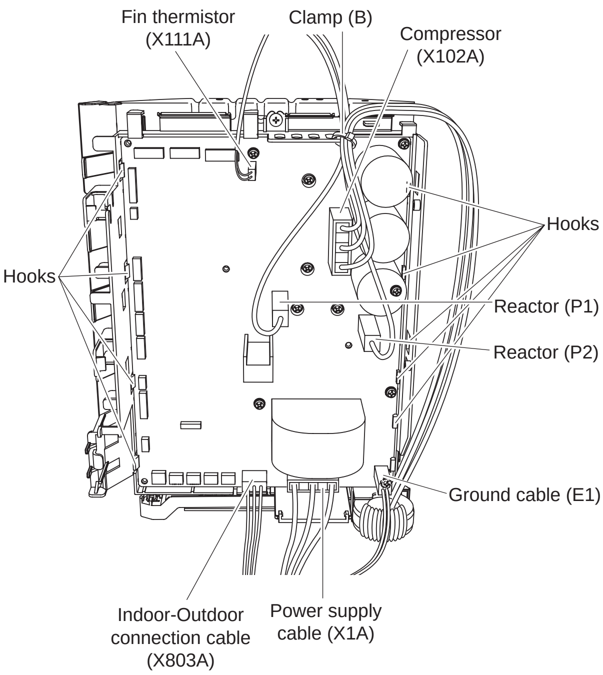




2.5 Removal of PC Board

Procedure

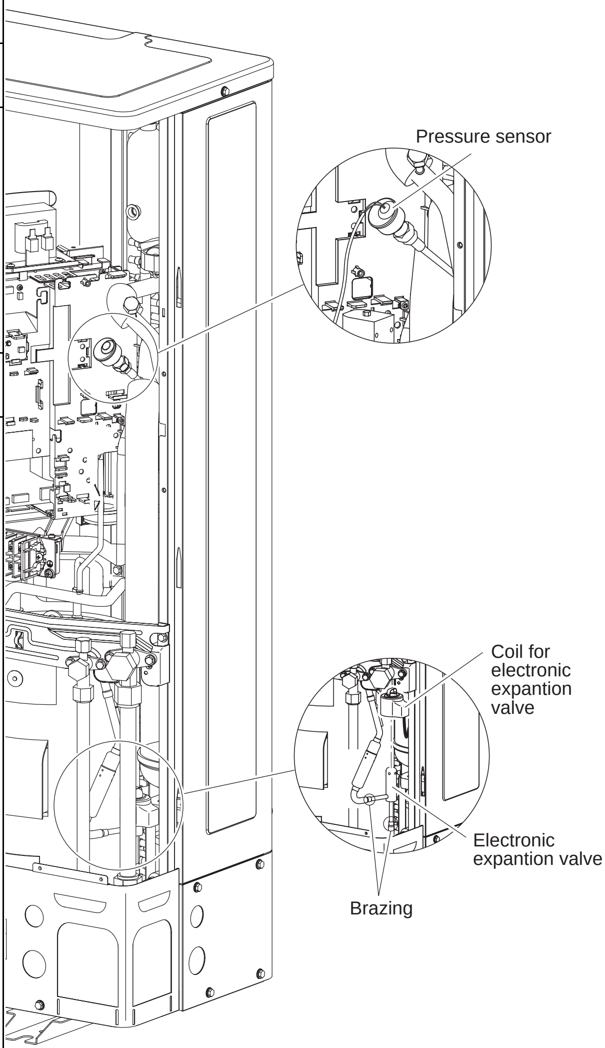
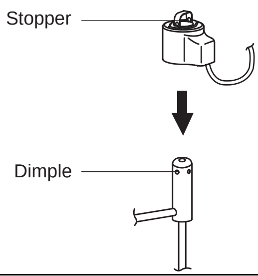
Warning! Be sure to commence the disassembling work after 10 minutes or more elapsed from all power supplies have been turned off.

Step	Procedure		Points
■	Remove the top panel and the front panel (2) accordance with the Removal Procedure for Outside Panels.		
Remove the PC board (A2P)			
1	Disconnect the connector (X205A) from the PC board.		
2	While pressing the two hooks, remove the PC board (A2P).		
Remove the PC board (A1P)			
■	Remove the switch box accordance with the Removal procedure for the switch box.		
1	Remove the clamp from the compressor harness.		
2	Press the hooks to remove the terminal block.		
3	Cut the two clamps (A).		
4	Extend the hooks, and then remove the support leg of the cover of electrical components.		
5	Disengage the three hooks on the left side, and then while pushing down the two hooks on the right side, remove the whole cover of the electric components.		
6	Cut the clamps (B).		■ Connectors used on the PC board
7	Disconnect the connector listed in point column.		· Compressor (X102A) · Ground cable (E1) · Reactors (P1 and P2)
8	Remove the PC board (A1P) together with the radiating fin.		· Power supply cable (X1A) · Indoor-Outdoor connection cable (X803A)

2.6 Removal of Pressure Sensor, Electronic Expansion Valve, and Others

Procedure

Warning! Be sure to commence the disassembling work after 10 minutes or more elapsed from all power supplies have been turned off.

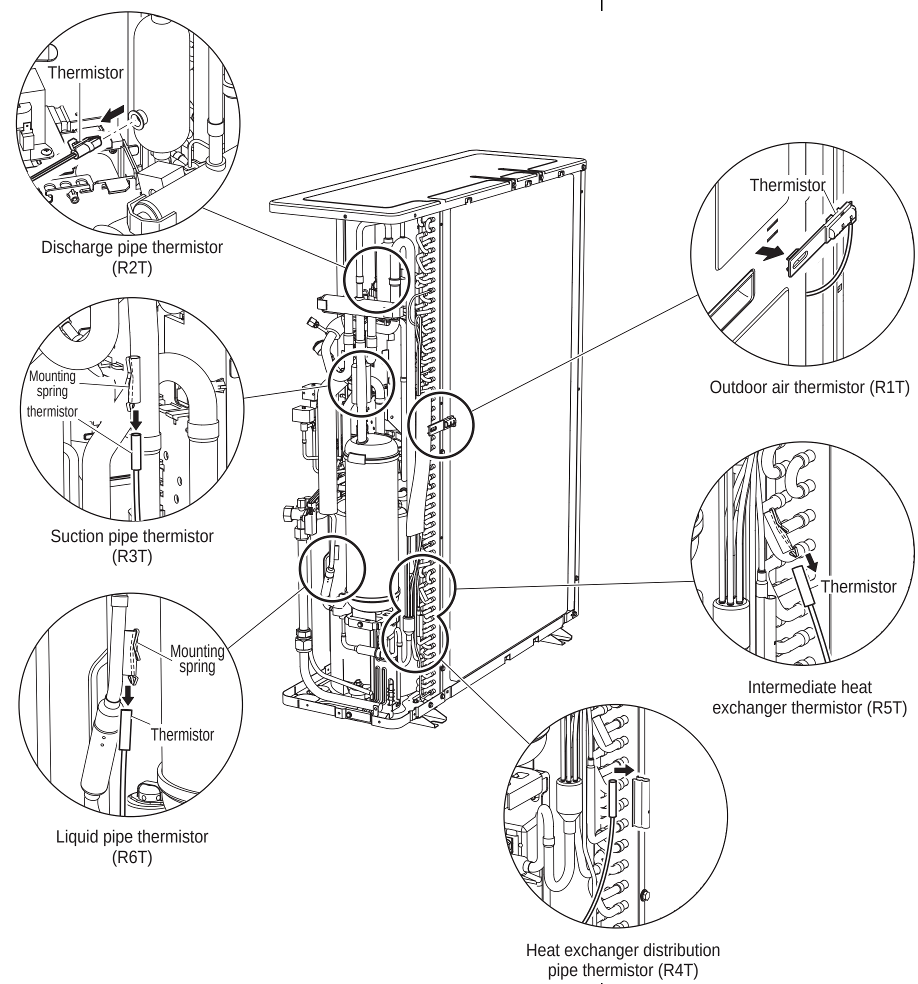
Step		Procedure	Points
■	Remove the top panel and the front panel (2) accordance with the Removal Procedure for Outside Panels.		
1	Remove the pressure sensor		
1	Disconnect the pressure sensor connector (X17A).		
2	Use two spanners to remove the pressure sensor.		
2	Remove the electronic expansion valve.		■ Before removing the electronic expantion valve, be sure to recover the refrigerant.
1	Disconnect the electronic expantion valve connector (X21A).		
2	Pull out the coil for the electronic expantion valve coil upward.		
3	Remove brazing from the two places, and then remove the electronic expantion valve.		Precaution for mounting the coil for the electronic expantion valve ↓ Align the dimple of the electronic expantion valve and the stopper of the coil for the electronic expantion valve, and then push them in until you hear them click. 

2.7 Removal of Thermistor

Procedure

Warning! Be sure to commence the disassembling work after 10 minutes or more elapsed from all power supplies have been turned off.

Step	Procedure	Points
■	Remove the top panel and the front panel (2) and side panel accordance with the Procedure for Outside Panels.	
1	Pull out the outdoor air temperature thermistor to the front, and then slide this thermistor to the right to remove it.	
2	Pinch the mounting spring that fixes the discharge pipe thermistor to pull out this thermistor.	
3	Press the fixing section of the suction pipe thermistor to pull out this thermistor.	
4	Pull the fixing bracket of the heat exchanger's distribution pipe thermistor to the front, and then remove this thermistor.	
5	Press the fixing section of the heat exchanger's intermediate temperature thermistor to pull out this thermistor.	
6	Press the fixing section of the liquid pipe thermistor to pull out this thermistor.	



*1

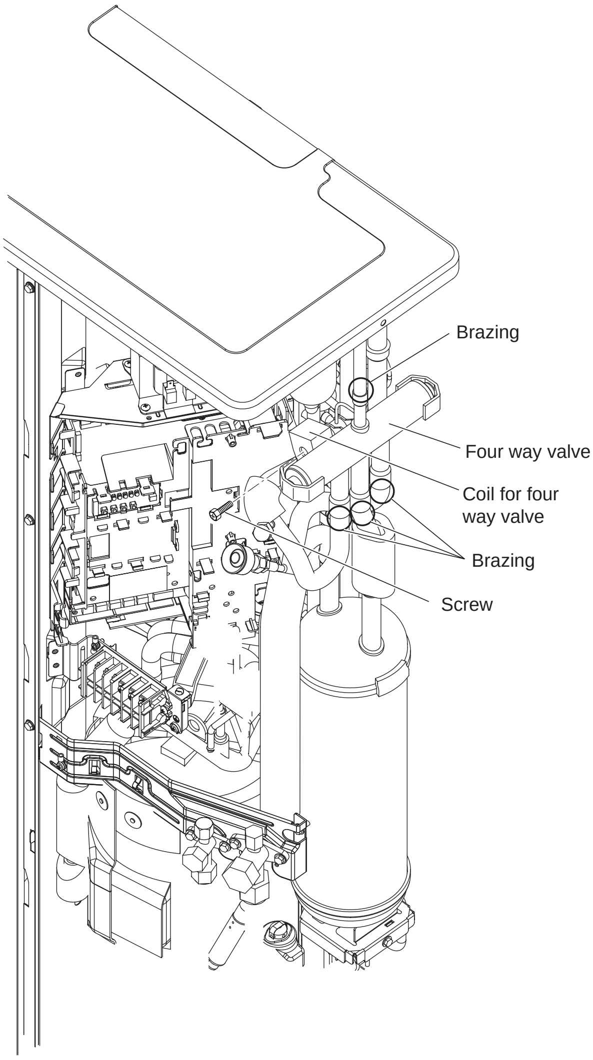
The heat exchanger's distribution pipe thermistor, heat exchanger's intermediate temperature thermistor, and liquid pipe thermistor are jointed together with a single connector. Consequently, these three thermistors should be replaced at the same time.

5

2.8 Removal of Four Way Valve

Procedure

Warning! Be sure to commence the disassembling work after 10 minutes or more elapsed from all power supplies have been turned off.

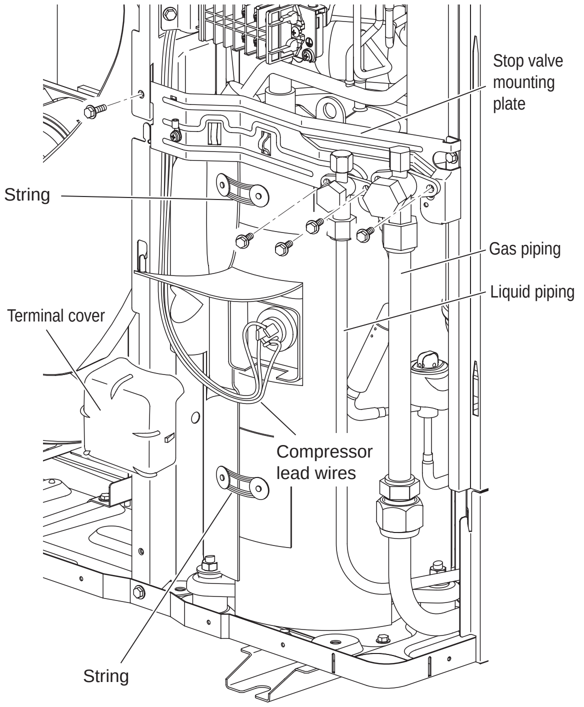
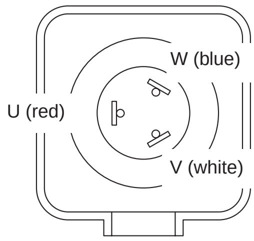
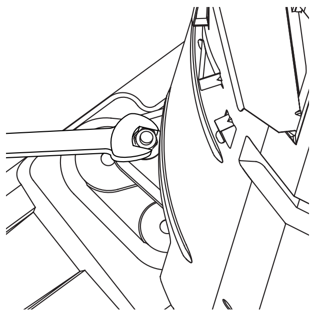
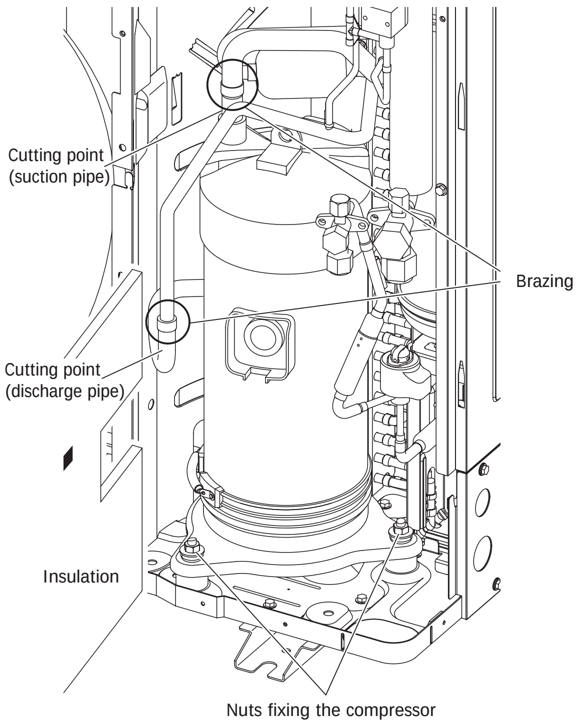
Step	Procedure		Points
	■ Recover the refrigerant. ■ According to the procedure for the removal related to the outside panel, remove the front panel (2) and the side panel. ■ According to the procedure for the removal of switch box, remove the switch box.		■ Be sure to remove the four way valve only after the refrigerant is completely recovered.
1	Unscrew the one screw that fixes the coil for the four way valve, and then remove this coil.		
2	Remove brazing from the four places, and then remove the four way valve. (Refer to point column.)		■ To prevent the four way valve from exceeding a temperature of 120°C, conduct brazing work while cooling the valve with wet cloths or else.

5

2.9 Removal of Compressor

Procedure

Warning! Be sure to commence the disassembling work after 10 minutes or more elapsed from all power supplies have been turned off.

Step	Procedure		Points
■	Recover the refrigerant. (Refer to point column.) ■ Remove the front panel (2) and the front piping cover bracket.	 	■ Be sure to remove the compressor only after the refrigerant is completely recovered.
1	Unscrew the five screws that fix the stop valve mounting plate, and then remove this mounting plate.		■ Terminal block 
2	Remove the gas piping and the liquid piping.		
3	Remove the compressor terminal cover.		
4	Disconnect the lead wires from the terminal block.		
5	Loosen the two strings, and then pull out the sound insulation of the compressor.		■ One out of the nuts that fix the compressor is located outside of the partition panel. 
6	Unfasten to remove the three nuts that fix the compressor. (Refer to point column.)	 	
7	Cut the suction pipe and the discharge pipe using a pipe cutter. (Refer to point column.)		
8	Remove brazing from the three places.		■ Be sure to cut thee pipes by using a pipe cutter before disconnecting the brazed sections of pipes. A sudden disconnection of the brazed sections can cause oil to catch fire.
9	Lift to pull out the compressor.		

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Numerics

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